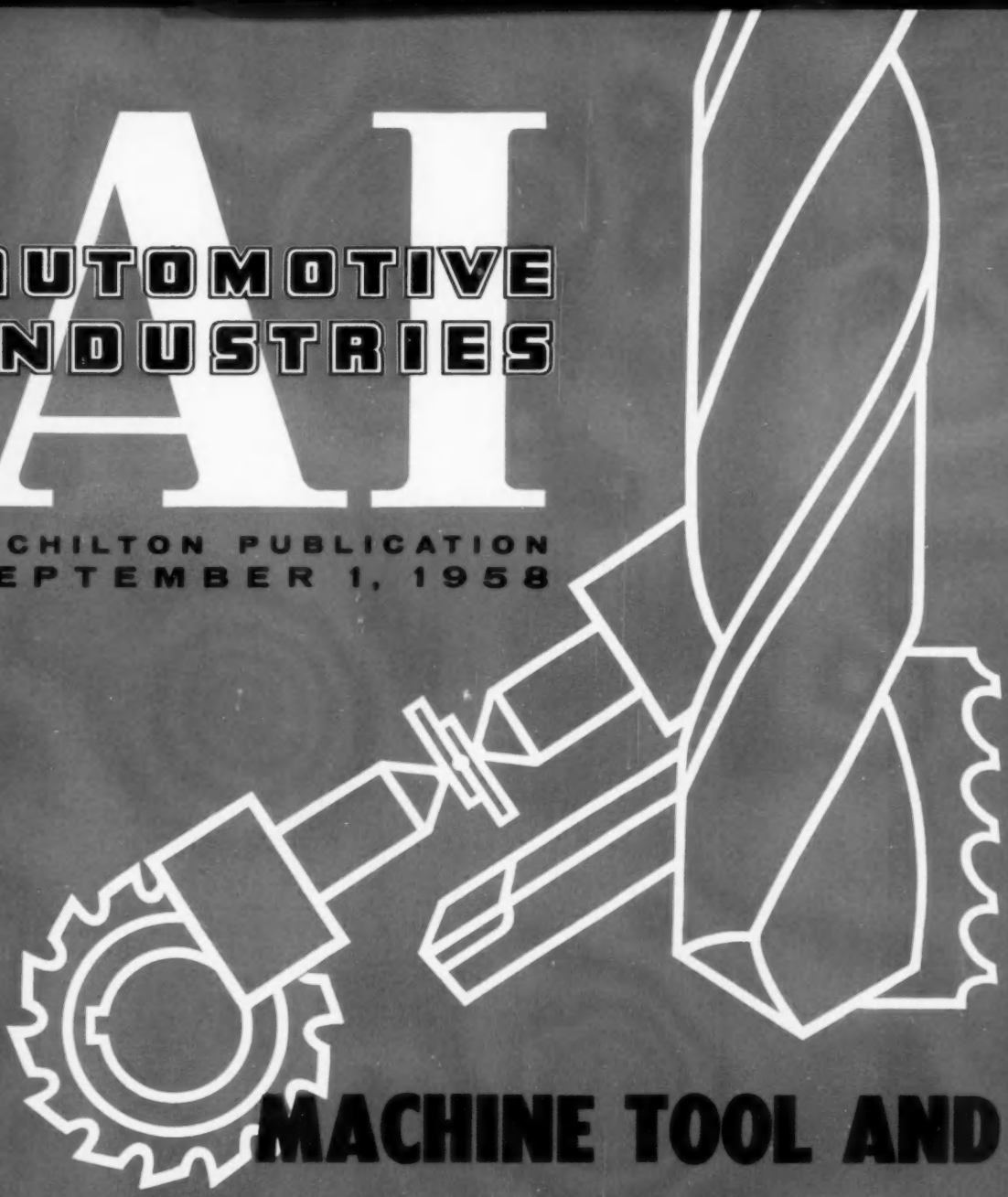
AUTOMOTIVE INDUSTRIES

AI

A CHILTON PUBLICATION
SEPTEMBER 1, 1958



MACHINE TOOL AND PRODUCTION EQUIPMENT

SECTIONS

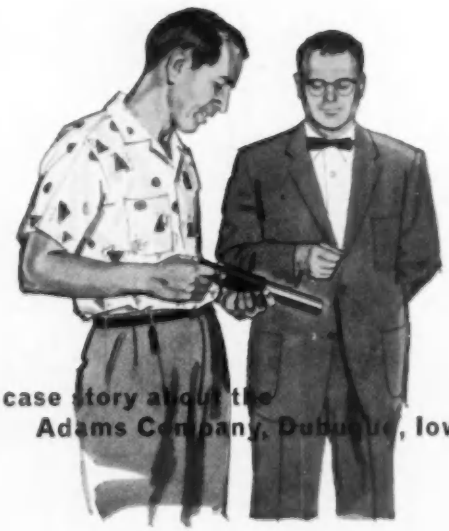
	PAGES
MACHINE TOOL	79- 97
FORMING	98-104
PROCESSING	105-110
AUTOMATION AND MATERIAL HANDLING	111-114
QUALITY CONTROL	115-118
WELDING	119-122
SPECIALIZED	123-129

▼ Complete Table of Contents Page 3

ADDED FEATURE — MODERNIZATION OF PRODUCTION EQUIPMENT

Bob showed them a new product that ended rust on work and tools—

STANDARD Special Transparent Coolant



A case story about the Adams Company, Dubuque, Iowa

Before Standard Oil lubrication specialist Bob Wenger told The Adams Company management about Standard's SPECIAL TRANSPARENT COOLANT, there had been considerable trouble with rusting of work and machines in the plant. There had also been trouble with deposits on the ways of the grinding machines. Rust occurring on parts being processed was resulting in damage and even losses. This has been changed.

"Since we changed to your SPECIAL TRANSPARENT COOLANT, we have not had any rusting or deposits on our machine tools, and this product has eliminated the rusting problem on parts being processed through our plant," says Harlow Adams, president of the company.

The Adams Company found they received important additional benefits as well. Operators could now see their work clearly. There was less wheel loading. Because the coolant didn't foam, more of it stayed on the wheel resulting in cooler operation. Faster cuts were obtained with finer wheels. Finer wheels gave better finishes. Periods between dressings were extended. Tolerances were maintained.

Research, development and more than two years of field testing have gone into Standard's SPECIAL TRANSPARENT COOLANT. This is the pay-out to you on the research done by Standard Oil to bring you better metalworking products. Find out more about Standard's SPECIAL TRANSPARENT COOLANT. Call your nearby Standard Oil lubrication specialist in any of the 15 Midwest or Rocky Mountain states. Or write **Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.**

Quick facts about

Special Transparent Coolant

- Clear, transparent fluid.
- Able to control corrosion and rust on work and machines.
- All chemical. Does not support bacteria growth.
- Unaffected by humidity.
- Nonfoaming.
- Fire resistant.
- Odorless.

No rust. Shaft ground with Standard's SPECIAL TRANSPARENT COOLANT shows no rust on inspection by A.T. Murphy, General Superintendent, Harlow Adams, President, and Bob Wenger, Standard Oil lubrication specialist.

You expect more from STANDARD *and get it!*

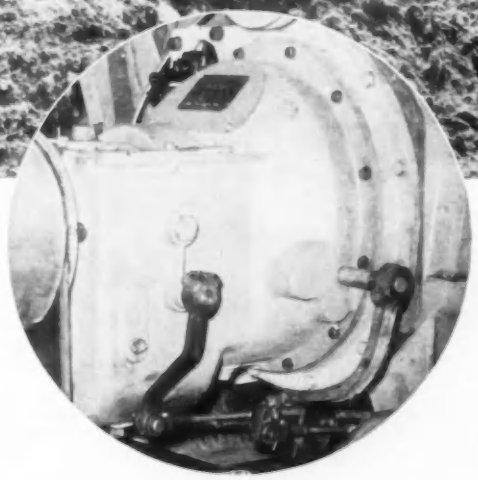
Another construction problem solved . . .
by COTTA HEAVY-DUTY TRANSMISSION

Insley "Pipeliner" at work digging 30 in. gas line near Edinburgh, Ind.

With a special problem to solve, Insley engineers found that a Cotta transmission could easily be adapted for a quick, reliable solution.

On the job illustrated, the new Insley "Pipeliner" excavator digs out turns and rock formations left by the speedier light-duty ditching machine. To facilitate rapid movement from location to location, the excavator was equipped with a special Cotta transmission having one to one forward ratio for digging, and two to one overspeed to keep up with pipeline operations.

If you need large- or small-quantity production of special-purpose or specially engineered heavy-duty transmissions, why not call Cotta? Cotta engineers can supply or design a gear box that will give you dependable, trouble-free service under the toughest conditions. Diagrams and complete specifications sent free on request.



Broad range of ratios

Input torques from 150 to 1,350 ft lbs

For use on cranes, shovels, rock crushers, generators, pumps, etc.

THIS INFORMATION WILL HELP YOU

Sent free on request — diagrams, capacity tables, dimensions, and complete specifications. State your problem — COTTA engineers will help you select the right unit for best performance. Write today.

COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS

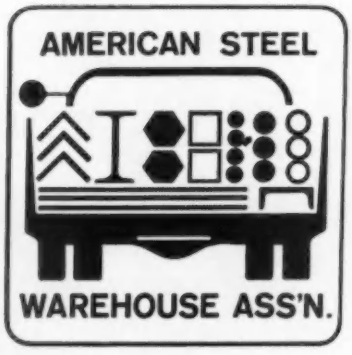
An Assurance of Dependable Service

COTTA
HEAVY-DUTY
TRANSMISSIONS
"Engineered-to-order"

Metal users, you can simplify... you can save money by standardizing on two alloy steels...

4620...4340

easy to get at your Steel Service Center



Standardize on AISI 4620 and 4340 and you standardize on fabricating and heat treating processes...

Simplify inventory and purchasing...

Save money by cutting production costs right down the line...

You standardize, simplify and save money when you use AISI 4620 and 4340...available coast-to-coast from Steel Service Centers. For a list of these sources write:

THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street INCO **New York 5, N. Y.**

AUTOMOTIVE INDUSTRIES

A CHILTON MAGAZINE — PUBLISHED SEMI-MONTHLY

SEPTEMBER 1, 1958 — VOL. 119, NO. 5

MACHINE TOOL AND PRODUCTION EQUIPMENT SECTIONS

MACHINE TOOLS 79
FORMING EQUIPMENT 98
PROCESSING EQUIPMENT 105
AUTOMATION, MATERIAL HANDLING 111
QUALITY CONTROL EQUIPMENT 115
WELDING EQUIPMENT 119
SPECIALIZED EQUIPMENT 123

FEATURES

Industry Statistics 63
Production Equipment Modernization a Must. *By Joseph Geschelin* 74

NEWS PREVIEWS

S-P Announces New Plans 55
Car Makers Offer Fewer Series in 1959 Models .. 55
Labor Negotiations 56
Ford to Add New Line of Industrial Tractors 57
GE Develops New Nitrile Silicone Rubber 57
Ford's New Engine Plant 58
Kaiser Predicts Greater Use of Aluminum 58
Swivel Seats Will Be Offered by Chrysler 59
Goodyear Marketing New Tire 59
Plymouth to Get Bigger Push in 1959 60
Republic Completes Model of Space Engine 62

DEPARTMENTS

Calendar of Coming Events 28
High Spots of This Issue 53
News of the Automotive and Aviation Industries 55
Men in the News 64
Machinery News. *By Charles A. Weinert* 130
Metals. *By William F. Boericke* 132
Automation News Report. *By Samuel Cummings* .. 134
Free Literature and Free Information Service ... 139
On Our Washington Wire 143
Shorties 165
Observations. *By Joseph Geschelin* 166

Business Department and Staff 53
Chilton Officers and Directors 53
Advertisers' Index 174

EDITORIAL STAFF

JAMES R. CUSTER, Editor
H. H. ROBERTS, Engineering Editor
ANDREW SHEARER, Market Research Editor
ROBERT P. HOMER, Editorial Production Mgr.
DAVID A. PARTRIDGE, Aviation Editor
MARCUS AINSWORTH, Statistical Editor
HAROLD M. NELSON, Specifications Editor
SAMUEL CUMMINGS, News Editor
HOWARD KOHLBRENNER, Art Director

DETROIT
Joseph Geschelin, Detroit Editor
Hugh C. Quinn, Detroit News Editor

PHILADELPHIA & NEW YORK
Charles A. Weinert, Eastern Editor

WASHINGTON
George H. Baker, Washington Editor
Ray M. Stroupe, Wash. News Editor
Neil R. Regeimbal, Wash. News Editor

CHICAGO
Kenneth Rose, Mid-West Editor

LOS ANGELES
R. Raymond Kay, Pacific Coast Editor

BERN
Robert S. Braunschweig, European Correspondent

LONDON
David Scott, British Correspondent

Paul Wooton, Washington Member, Editorial Board
Robert Gunning, Readability Consultant

As part of its worldwide automotive and aviation news coverage, AUTOMOTIVE INDUSTRIES is serviced by United Press International and has editorial correspondents in major United States and Foreign industrial centers

Copyright 1958 by Chilton Company

MEMBER — Society of Business Magazine Editors

NBP National Business Publications, Inc.

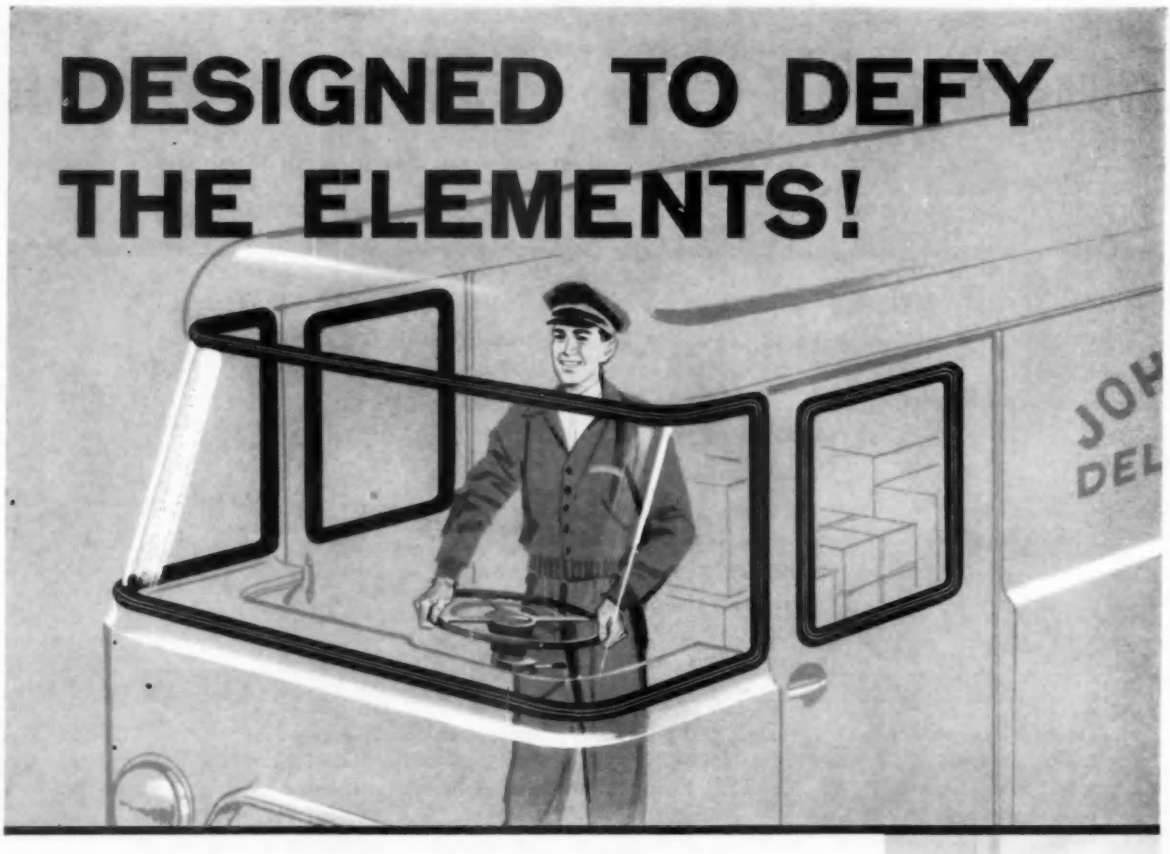
ABC Audit Bureau of Circulations

AUTOMOTIVE INDUSTRIES is a consolidation of The Automobile (weekly) and the Motor Review (weekly) May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

EDITORIAL EXECUTIVE OFFICES, Chestnut and 56th Sts., Philadelphia 39, Pa., U. S. A. Cable address—Autoland, Philadelphia.

AUTOMOTIVE INDUSTRIES. Published semi-monthly by Chilton Company, Chestnut & 56th Sts., Phila. 39. Entered as Second Class Matter October 1, 1925, at the Post Office at Philadelphia, Pa.; Under the Act of Congress of March 3, 1879. Subscription price: To manufacturers in and suppliers to the automotive industries in the U. S., U. S. Possessions and Canada, $2.00 per year; $3.00 for 2 years. All Others, $10.00 per year. Single copies, 50c. Statistical Issue, $1.00.

DESIGNED TO DEFY THE ELEMENTS!

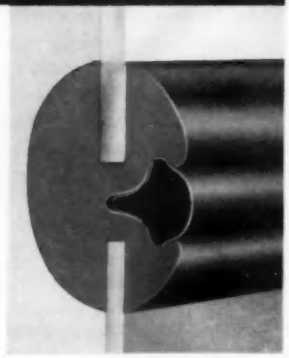


INLAND
Self-Sealing Weather Strip

No glass or plastic—flat or curved—will ever leak under any conditions *in any weather* when sealed with Inland Self-Sealing Weather Strip. What's more, Inland Self-Sealing Weather Strip is built to withstand shocks and vibrations even during extremes of weather with no effect on its weather-proof qualities.

Costs Less to Install . . . Less to Replace

One man can install or replace Inland Self-Sealing Weather Strip with a minimum of time, effort, and materials, and no special mounting surface, channels, moldings, cements or binders. Available in many standard shapes and sizes, or, can be made to your specifications for any installation or service requirement. Constant use under all weather extremes proves Inland Strip best for manufacturer, user, and service. Be sure! Simply design or specify Inland Self-Sealing Weather Strip. For more information, write, wire or phone.



IT'S PERMANENTLY LEAKPROOF IN 3 EASY STEPS

1. Body panel is fitted into strip.
2. Glass is fitted into the strip.
3. Over-Sized filler strip zips into locking channel, expanding and compressing entire strip into one permanent, leakproof seal.

INLAND MANUFACTURING DIVISION
General Motors Corporation • Dayton, Ohio

INLAND SELF-SEALING WEATHER STRIP IN *ACTION*

Transportation Industry | Railway Equipment | Marine Applications | Automotive Installations | Over-the-road Equipment | Commercial Structures

Ask for a sample TEST BAR

of *La Salle's* revolutionary

fatigue-proof steel

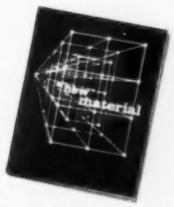
The steel bar that has high strength WITHOUT HEAT TREATING

Yes, La Salle invites you to test a sample bar of the remarkable new FATIGUE-PROOF. This amazing new material is its own best recommendation . . . as proven by the many original equipment manufacturers who have already tested (and are using) FATIGUE-PROOF.

If you are making parts requiring strengths in the tensile range of 140,000 to 150,000 psi, and want to eliminate the expense or problems of heat treating . . . if you want to save production costs with a bar that machines faster (25% faster than annealed alloys—50% to 100% faster than heat treated alloys) and gives you a beautiful finish, too . . . if you want to improve the quality of your product while saving money, send us a blueprint, drop us a note giving application details, or better yet . . . pick up your telephone and call a La Salle sales engineer (REgent 4-7800, Chicago, Illinois).

FREE

Get your copy of "a new material," a 24-page booklet which gives detailed information on La Salle "FATIGUE-PROOF"® steel bars.



La Salle STEEL CO.

1436 150th STREET • HAMMOND, INDIANA

Manufacturers of America's Most Complete Line of Quality Cold-Finished Steel Bars

Please send me your "FATIGUE-PROOF" Bulletin.

Name_____

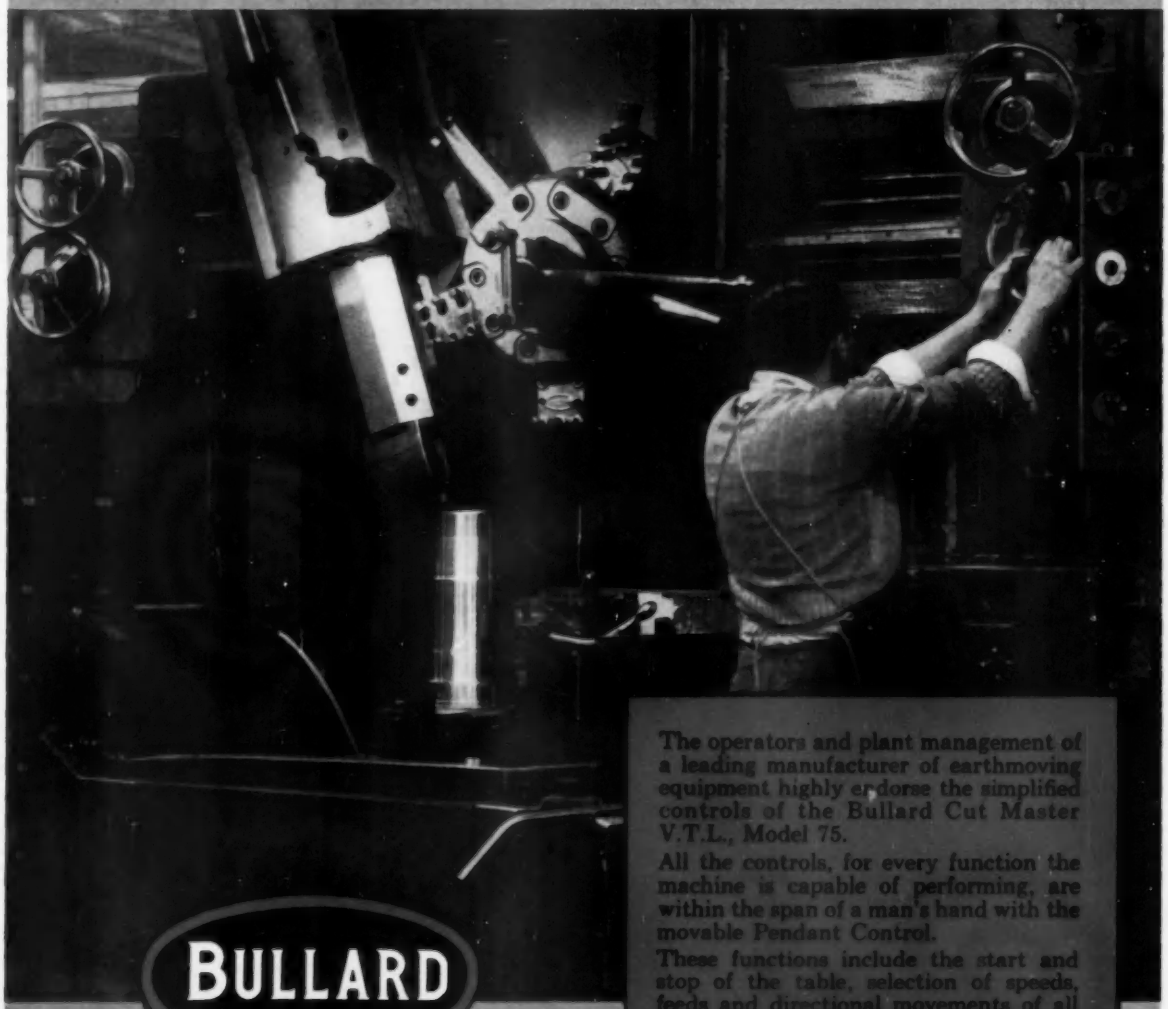
Title_____

Company_____

Address_____

City_____ Zone____ State_____

Simplified Controls win enthusiastic approval



BULLARD

The Bullard Company
Bridgeport 9, Conn.

The operators and plant management of a leading manufacturer of earthmoving equipment highly endorse the simplified controls of the Bullard Cut Master V.T.L., Model 75.

All the controls, for every function the machine is capable of performing, are within the span of a man's hand with the movable Pendant Control.

These functions include the start and stop of the table, selection of speeds, feeds and directional movements of all heads in feed or traverse.

This feature, a Bullard exclusive, improves the efficiency of the operator and increases production.

To cut costs when cutting metal

Buy BULLARD

design with assurance!

Cycolac can work design wonders for you. Extensively used in a host of end-use products similar to those illustrated here, Cycolac can help you design finer, more attractive-looking products—premium quality merchandise that stresses sturdiness, easier assembly, faster production and lower costs. Yes, to design it with full assurance, specify Cycolac.

CYCOLAC®

HIGH-IMPACT THERMOPLASTIC RESIN

...molded parts, extruded profiles, calendered sheets.

This family of single uniform resins provides a unique balance of properties, permitting fast molding, calendering and extruding. It is economical to form Cycolac press-polished sheets by vacuum, air-pressure, or mechanical methods over inexpensive molds of wood, plaster, aluminum, etc.

Write for latest technical data today!

PACESETTER IN

Marbon CHEMICAL

SYNTHETIC RESINS

Division of BORG WARNER • Washington, W. Va.

also represented by:

WEST COAST: Harwick Standard Chemical Co., Los Angeles, Cal.
CANADA: Dillons Chemical Co. Ltd., Montreal & Toronto
EXPORT: British Anchor Chemical Corp., New York

BW

Marbon

Enjay Butyl is used in the new Willys 'Jeep' FC-150 Truck—as weather strips, transmission mountings, small extrusions for doors.

ENJAY BUTYL

Improves performance, cuts costs in new 'Jeep'

The new Willys 'Jeep' "Forward Control" Truck features all-direction visibility. The more than 2,700 square inches of glass demanded a window-sealing material that would *stay* firm and weather-tight for the life of the truck. Supplier B. F. Goodrich Co. chose Enjay Butyl for weather-stripping because of its exceptional resistance to weather and aging. A tighter, longer-lasting seal is assured by the well-known vibration and shock-absorption qualities of Butyl—an important factor in this rugged-duty 'Jeep.'

Butyl offers improved quality at low cost. More and more automotive manufacturers are switching to Butyl. Today over 100 automotive parts are made with this modern rubber. For further information and expert technical assistance, write or wire the Enjay Company.

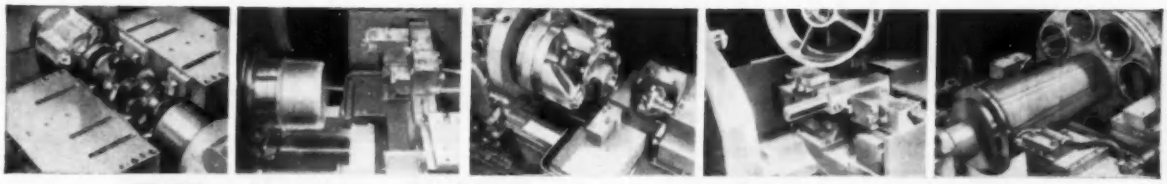
ENJAY BUTYL

Enjay Butyl is the greatest rubber value in the world. It's the super-durable rubber with *outstanding* resistance to aging • abrasion • tear • chipping • cracking • ozone and corona • chemicals • gases • heat • cold • sunlight • moisture.

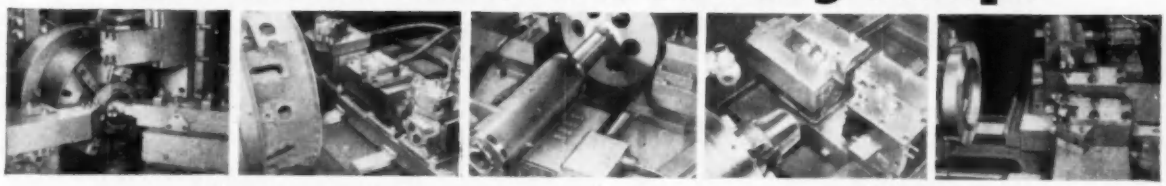
ENJAY *Pioneer in Petrochemicals*

ENJAY COMPANY, INC., 15 West 51st Street, New York 19, N. Y.

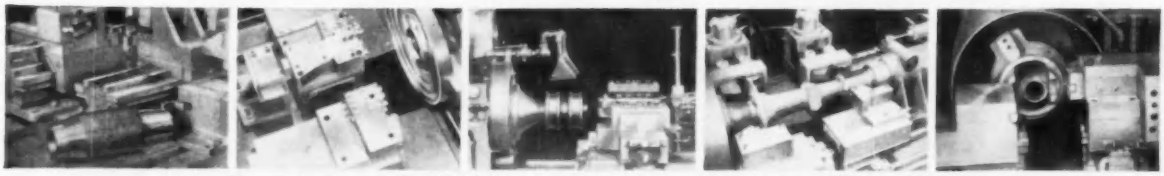
Akron • Boston • Charlotte • Chicago • Detroit • Los Angeles • New Orleans • Tulsa



All these different tooling setups



show the amazing versatility



# of this fully automatic lathe

...the SIMPLIMATIC

Here's versatility that beats any automatic lathe you ever saw! Actually, the Simplimatic is doing hundreds of jobs like these—jobs that would otherwise be put on *special* machines—built at extra-special cost. But this (and don't miss the important point!) is a *standard machine*—at a *standard price.*

If you have medium or long runs on parts up to 36¼" in diameter, get the facts about the Simplimatic Automatic Lathe.

GISHOLT
MACHINE COMPANY
Madison 10, Wisconsin

THIS CATALOG may show you how the Simplimatic can save thousands of dollars for you as it is doing for many others. Write for your copy.

Gisholt Machine Co.
Madison 10, Wisconsin
Gentlemen:
Please send my copy of the Simplimatic Catalog.

Name.....*Title*.....
Company.....
Address.....
City.....*Zone*....*State*.....

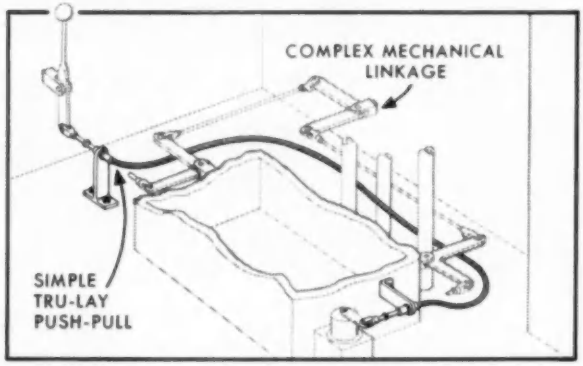
ASK YOUR GISHOLT REPRESENTATIVE ABOUT GISHOLT FACTORY-REBUILT MACHINES WITH NEW MACHINE GUARANTEE

(Advertisement)

with TRU-LAY PUSH-PULL controls, you can ---

MAKE HUNDREDS OF PRODUCTS MORE USEFUL, EASIER TO SELL

Tru-Lay Push-Pull controls provide positive remote action over long or short distances. Because they operate while flexing, they can snake around obstructions. They are ruggedly constructed, easily installed and operated, and are sealed against dirt and moisture. Push-Pulls are simple, have but one moving part, are noiseless, and give a lifetime of accuracy. Linkages, on the other hand, are complex. They're made of many parts, wear at many points, and produce increased backlash, lost accuracy, and vibration rattles.



Here's Why Push-Pull Controls Simplify Design, Give Better Performance

Long Life—We have never heard of a Tru-Lay Push-Pull wearing out in normal service.

Dependable Operation—Top performance under the most adverse conditions...in temperatures ranging from −70°F to the high levels of jet engine operation...in wet locations...in abrasive atmospheres.

Freedom from Trouble—Inner working member is fully protected by tough, flexible conduit...lifetime factory lubrication...sealed against entrance of dirt, moisture, and other foreign matter...cold swaging of all fittings.

Accuracy—Built to the most exact standards of quality and precision. On automobile pushbutton transmissions, for instance, Push-Pull controls provide five positions with a total movement of only .560".

Capacity—Push-Pull controls will handle jobs with as much as 1,000 lbs. input, 150 feet or more from the control point.

Adaptability—Push-Pull controls can be adapted to countless applications. Standard anchorages, fittings, and heads meet almost any requirement, and modifications can be made to fit special situations.

Design Engineers Report on Benefits

Saves Time, Labor, and Material
"We use Push-Pulls to operate clutch controls on the main power unit, feed conveyors, and delivery conveyors...and we save the time, labor, and material required for planning and engineering the old linkages."

Greater Flexibility of Design
"Push-Pulls give us flexibility in locating the hydraulic control valve in relation to the operator's position."

Cost Less to Install
"They are easier and less expensive to install than linkages for remote control of power take-off."

Solution to Tough Problem
"Can be installed where straight rods are impossible."

Eliminates Maintenance
"No maintenance whatsoever; not even lubrication is required."

Reduces Number of Parts
"Your Push-Pulls have eliminated links, radius rods, and other lost-motion devices for remote control of hydraulic valves."

Provide Accurate Control
"We get minimum backlash because the cable is designed to close tolerances with minimum drag and lost motion."

Push-Pulls Can Help Solve YOUR Remote Control Problems

Push-Pull controls are solid as a rod and flexible as a wire rope. You can use them in the electrical, hydraulic, and pneumatic systems on construction equipment, on farm implements...almost *anywhere* convenient remote control is desired. For complete details on how you can use them, write for a copy of the Push-Pull Data File. It contains 7 bulletins which describe in detail the operation of Push-Pulls, their applications, features, and advantages. Our engineers will be glad to help you make Tru-Lay Push-Pull controls a part of your product.

Automotive and Aircraft Division
AMERICAN CHAIN & CABLE

ACCO

601-H Stephenson Bldg., Detroit 2
2216-H South Garfield Ave., Los Angeles 22 • 929-H Connecticut Ave., Bridgeport 2, Conn.

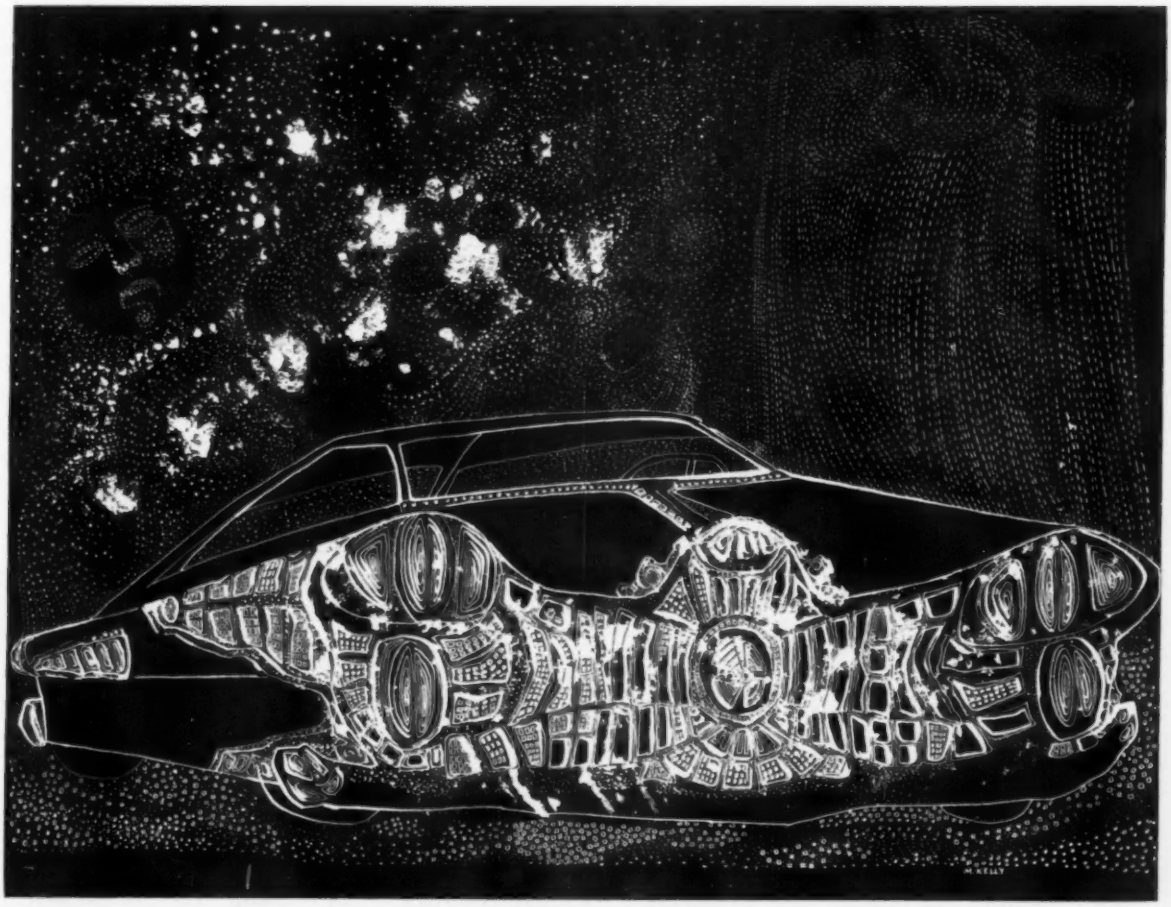
nightmare alley

If a car could dream, what stuff would its nightmares be made of? Untranquilized, tossing feverishly in its carport, it would fall prey to that ramshackle specter that haunts all denizens of the road. From its mechanical libido would emerge boogermen built of road salt, sea air, sand storms and freeze . . . enough to frighten any motor car right out of its trim.

Save that tender, quaking soul! Insure Valhalla by prescribing a liberal dose of Stainless Steel to last a lifetime . . . and to last without the bother of pads, polishes or protective fluids.

Actually, you'll be doing yourself a favor because Stainless Steel has sales appeal! Trim your new model with copious quantities of Stainless Steel and *tell* your customer about it. He already knows what a miracle metal Stainless is, but may not know that there is any on your car. As for yourself, you're surely aware that Stainless Steel trim often costs less than other materials because there are fewer fabricating steps, you can use thinner gages because it is so strong, and there is no need to overdesign to allow for corrosion or impact damage.

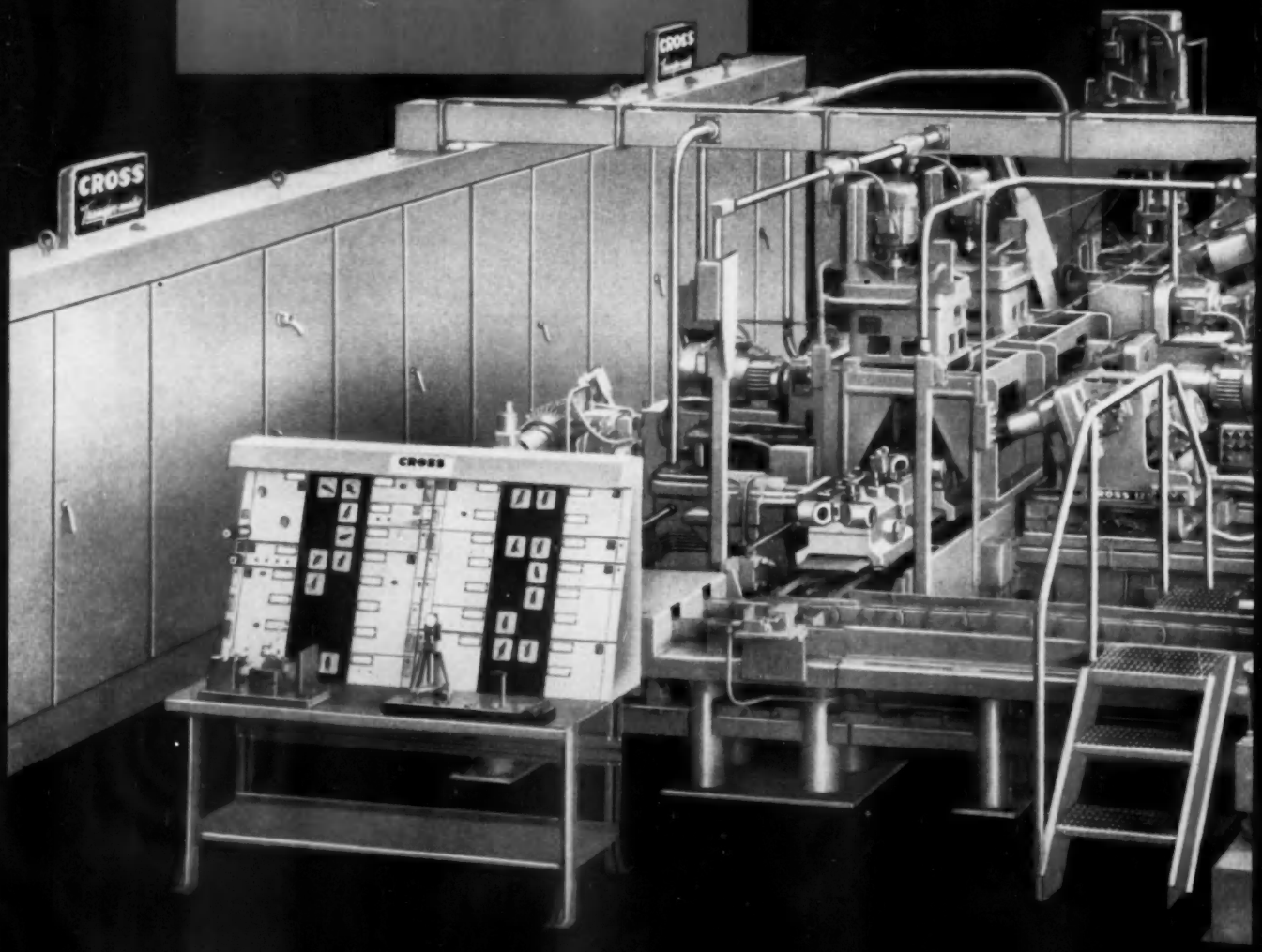
USS is a registered trademark

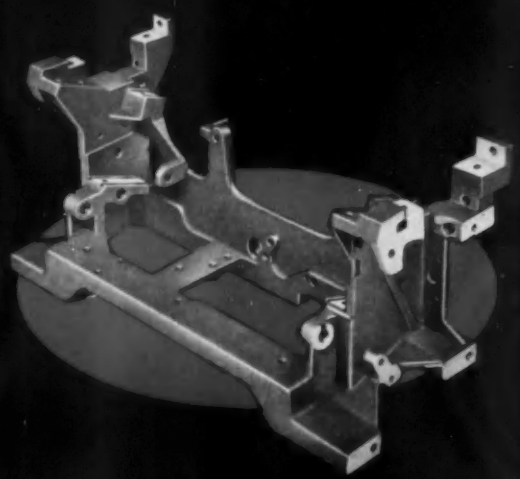


United States Steel Corporation—Pittsburgh
American Steel & Wire—Cleveland
National Tube—Pittsburgh
Columbia-Geneva Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Supply—Steel Service Centers
United States Steel Export Company

USS **United States Steel**

Completely Machines Aluminum Typewriter Frames





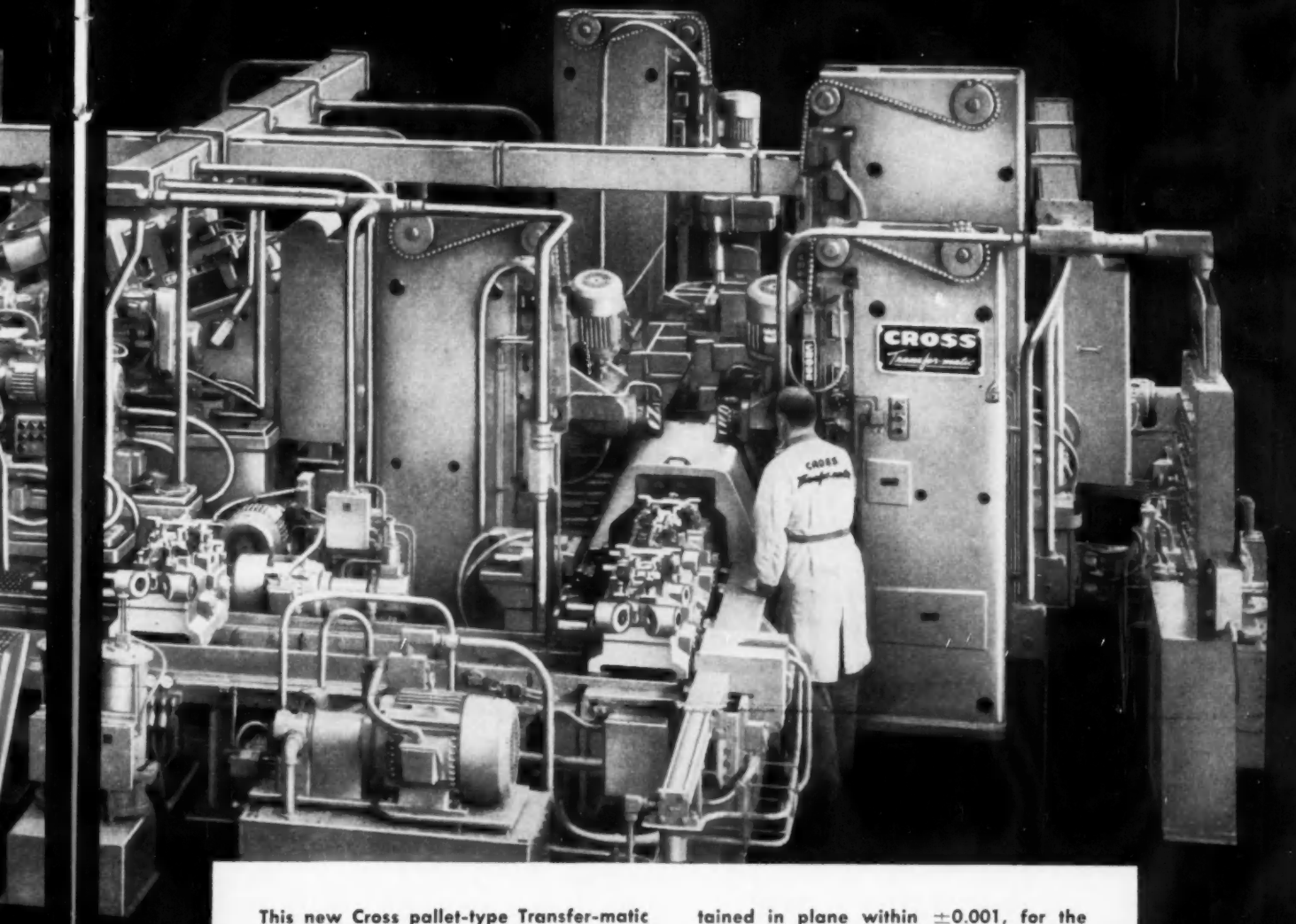
Established 1898

THE CROSS CO.

First in Automation

PARK GROVE STATION • DETROIT 5, MICHIGAN

Another Automation First by Cross



This new Cross pallet-type Transfer-matic completely machines aluminum die cast power frames for typewriters at a rated capacity of 150 per hour.

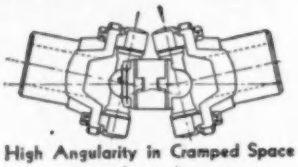
One hundred and five broaching, milling, drilling, reaming, spotfacing, chamfering and tapping operations are performed on each part. The delicate castings are precisely power clamped in pallet-type, two-position work holding fixtures, and transported through a loading station and eleven machining stations. Each part travels through the machine twice. On the first trip, the top, bottom and back side are exposed to the tools. On the second trip, the ends are exposed.

Tolerances for the rail seats are maintained in plane within ± 0.001, for the overall length within ± 0.003, for the shaft holes in line from end to end within ± 0.001, for the hole locations relative to milled surfaces within ± 0.003, and for the four broached spring seats in plane within ± 0.005.

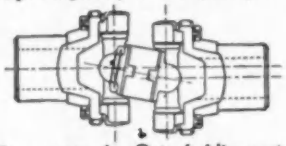
A Cross Machine Control Unit with Toolometers programs tool changes to minimize down time. Standard Cross Tool Setting Fixtures are used to pre-set all tools, thus eliminating trial cuts and adjustments.

Other features are complete interchangeability of all standard and special parts for easy maintenance, construction to JIC Standards, hardened and ground ways and automatic lubrication.

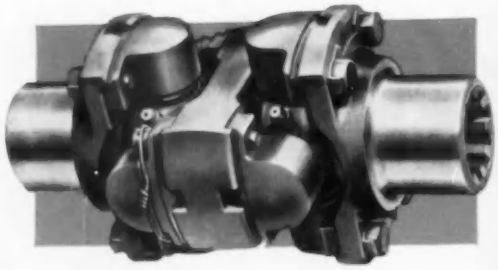
FLEXIBLE



High Angularity in Cramped Space

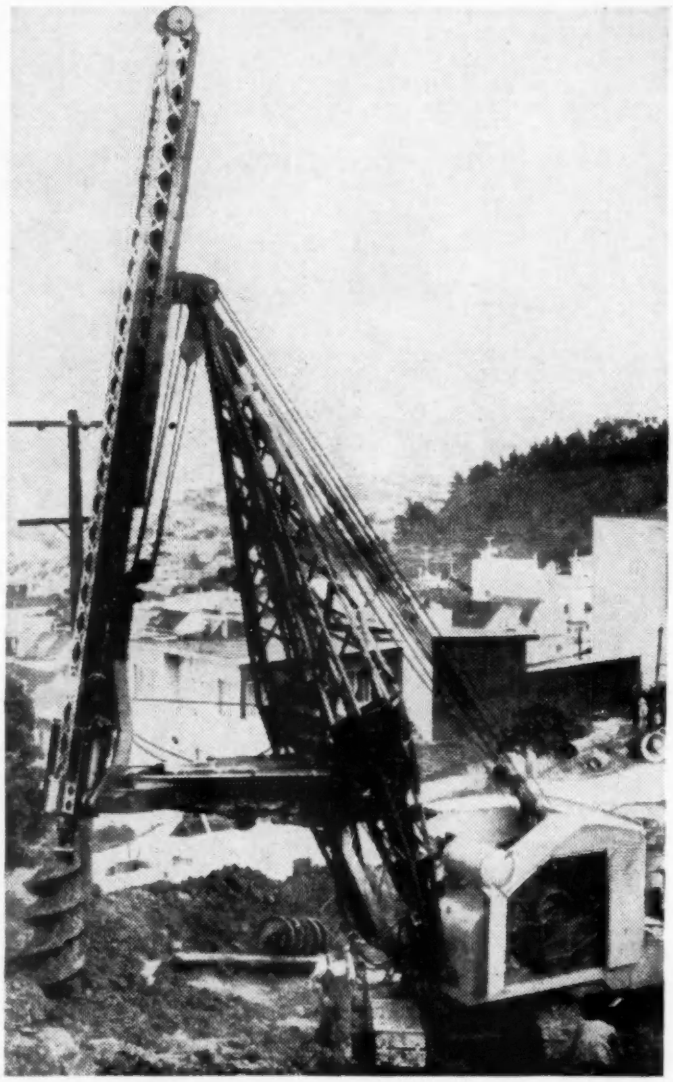


Compensates for Out of Alignment



In cramped quarters — where starts, stops and reverses are frequent — loads heavy and torque requirements severe — amid dust and moisture — MECHANICS Close-Coupled, Roller Bearing UNIVERSAL JOINTS serve dependably, safely and economically. They perform equally well in other rugged machines where joint space is limited and angles are extreme. Let MECHANICS engineers help you with your joint problems.

MECHANICS UNIVERSAL JOINT DIVISION
Borg-Warner • 2024 Harrison Ave., Rockford, Ill.
Export Sales: Borg-Warner International
36 So. Wabash, Chicago 3, Illinois



LARGEST OF ITS KIND IN THE WORLD, reportedly, is this huge earth-drilling machine, weighing 70,000 lbs. Recently used on the Portola Drive widening project in San Francisco, it was developed by Fred Pavlow, owner of P & Z Co., South San Francisco. Pavlow said the machine is ready for work 15 minutes after wheeling up to the job site and drills piling holes as large as eight ft. in diameter, at any angle and more than 100 ft. into ground.

MECHANICS
Roller Bearing BW
UNIVERSAL JOINTS
For Cars • Trucks • Tractors • Farm Implements • Road Machinery • Aircraft • Tanks • Busses and Industrial Equipment

ACP ALODINE* – its properties and functions in protecting aluminum alloys and bonding paint to them

By ALFRED DOUTY: Technical Director, AMCHEM PRODUCTS, INC.

Aluminum protects itself against corrosion by a coating of its own oxide. This adds weight, but does not provide complete protection. Even commercially pure aluminum in clean air at ordinary room temperature oxidizes indefinitely.

The use of adherent inorganic protective coatings on aluminum has long been recognized as efficacious in reducing corrosion rate and prolonging paint life. Since aluminum oxide tends to be protective, it is natural that the most intensive early efforts in this direction should have involved processes for improving the properties of the naturally occurring oxide coating. Anodizing, or electrochemical oxidation, although it is one of the most effective of such methods, is rather costly and time consuming.

ALODINE†

Early in 1945 a new chemical process was devised for producing an amorphous phosphate coating on aluminum. Its simplicity, speed and economy and the unique properties of the coating have resulted in wide commercial acceptance. It is called the Alodine Process.

Some idea of the effectiveness of the Alodine coating on unpainted 3S Grade aluminum may be had from Fig. 1. All panels were removed from the salt spray cabinet after 300 hr. except the Alodized and anodized panels, which were continued to 800 hr.

Organic protective and decorative coatings, such as paint, likewise require a corrosion-retarding undercoating of the kind produced by Alodine to achieve their maximum life and adhesion.

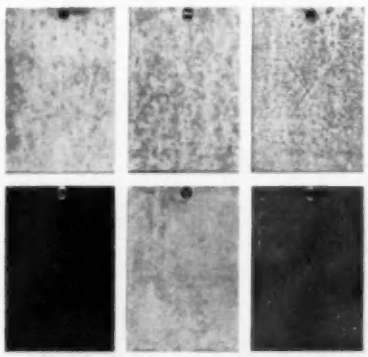


Fig. 1. Salt spray test comparison of Alodine with other surface treatments on unpainted aluminum. (Left to right, top row) solvent wiped —300 hr.; alkali cleaned—300 hr.; phosphate coated—300 hr. (Bottom row) chemically oxidized—300 hr.; anodically oxidized—800 hr.; Alodized—800 hr.

The effect of the Alodine coating in retarding underpaint corrosion is shown in Fig. 2. The Alodized panel was given a top coat only. All other panels in the series were primed after the surface treatments with a regular automotive product, baked, given a surface coat dry-scuffed with sandpaper as per standard automotive practice, and then finished with a regular black baked top coat. The panels were removed from the salt spray after failure of the paint film had set in.

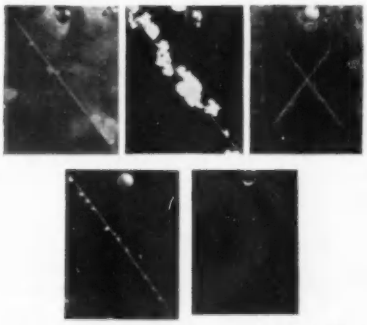


Fig. 2. Salt spray test comparison of Alodine with other surface treatments in retarding underpaint corrosion. (Left to right, top row) alkali cleaned and phosphoric acid dipped—300 hr.; phosphoric acid, solvent cleaned—300 hr.; zinc phosphate coated—400 hr. (Bottom row) anodically oxidized—3000 hr.; Alodized—3000 hr.

COATING CHARACTERISTICS

The coating produced by this new process is an amorphous metallic phosphate, dense, rather hard, and apparently nonporous. Unlike most oxide films, it is nonabsorptive and cannot be dyed or stained. Sealing in hot water or salts has no apparent effect. It differs markedly in appearance from previously known phosphate coatings, as shown in Fig. 3.

Electrical Resistance. Very little information is available at the present time on the electrical properties of the coating, but it is known that resistance increases very rapidly with thickness and as a result coatings normally produced offer extremely high resistance.

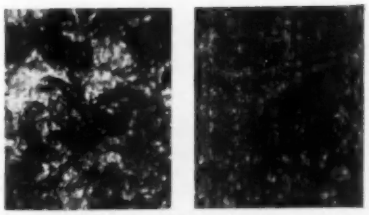


Fig. 3. (Left) conventional phosphate coating on aluminum; (right) Alodine coating produced in 3-min. immersion, rinsed and air dried. Magnification 500 diam.

Weight and thickness. Generally speaking, the weight of the amorphous phosphate coating increases with processing time, bath strength, and bath temperature. It is interesting to note that the increase becomes less and less pronounced as the temperature increases and actually reverses itself into a sharp decline between 130 and 140°F.

Adhesion. The original purpose in development of this process was to improve adhesion of the paint to aluminum surfaces and thus lengthen their overall life. Only later was it discovered that the film itself provides corrosion resistance.

Resistance to Bimetallic Corrosion. Since it has very high surface resistance, the coating, as would be expected, offers good resistance to bimetallic or galvanic corrosion. Test samples are available to illustrate the insulating effects.

We present here a general and by no means complete, report on ACP Alodine—its properties and uses in protecting aluminum alloys. Your ACP sales representative can give you a much fuller story. Or write us at Ambler.

*Alodine is a registered trademark of Amchem Products, Inc.

†Since the introduction of Alodine amorphous phosphate coatings, ACP has developed a complete line of Alodine amorphous chromate coatings for superior corrosion resistance.

Amchem Products, Inc. Ambler 38, Pa.

Formerly AMERICAN CHEMICAL PAINT COMPANY

CHEMICALS ACP PROCESSES

DETROIT, MICH. • ST. JOSEPH, MO.
NILES, CALIF. • WINDSOR, ONT.

New Chemical Horizons for Industry and Agriculture

ANOTHER EXAMPLE OF HOW CONTINUING RESEARCH KEEPS R/M FIRST IN FRICTION

A few of the wide variety of shaped friction parts made by R/M

How to tame a "fast-braking" friction curve

When friction material problems throw you a bad curve, because of fade wear or noise, let R/M go to bat for you!

No matter what the shape, size or application, you can rely on R/M for the solution to your friction problem.

To get greater performance and lower costs, machines and equipment often require special shaped friction parts. Industrial presses, for example, require friction clutches in many shapes and sizes.

Over the years, R/M has engineered and produced every conceivable shape and kind of friction material. Friction parts range from clutches, brake blocks, linings, and automatic transmission components to tiny friction members in aircraft. This experience can be yours.

And you can always rely on completely unbiased recommendations when you consult R/M. Because only R/M makes all types of friction materials.

An R/M sales engineer can be at your desk within 24 hours to help you with *any* friction problem.

Next time you're at bat, and friction throws you a bad curve, let R/M help you with the answer. Profit from our experience!

Write now for your free copy of R/M Bulletin No. 500. Its 44 pages are loaded with practical design and engineering data on all R/M friction materials.

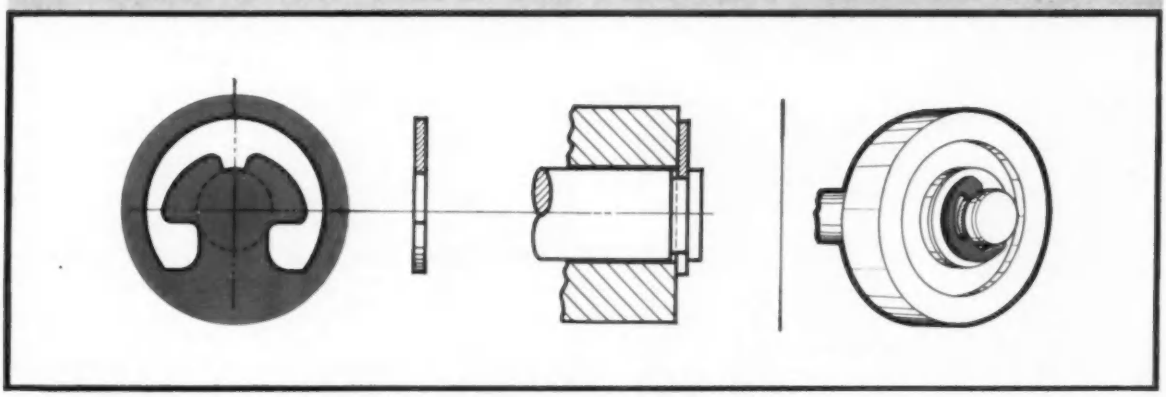
R/M FIRST IN FRICTION

RAYBESTOS-MANHATTAN, INC.

EQUIPMENT SALES DIVISION: Bridgeport, Conn. • Chicago 31 • Cleveland 16 • Detroit 2 • Los Angeles 58

RAYBESTOS-MANHATTAN, INC., Brake Linings • Brake Blocks • Clutch Facings • Sintered Metal Products Industrial Adhesives • Mechanical Packings • Asbestos Textiles • Industrial Rubber • Rubber Covered Equipment • Engineered Plastics • Abrasive and Diamond Wheels • Laundry Pads and Covers • Bowling Balls

New Waldes Truarc Reinforced "E-ring" Provides 5 Times More Gripping Power, 50% Higher RPM Limits Than Conventional E-Type Rings



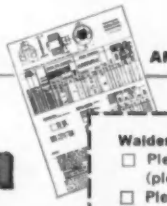
The new Waldes Truarc Series 5144 is a radially-installed reinforced "E-ring." It is designed for use in assemblies where the ring is subject to strong push-out forces resulting from heavy vibration and shock loads, high rotational speeds or relative rotation between the retained parts.

Series 5144 provides the following application advantages over conventional E-type fasteners:

1. **GREATER GRIPPING STRENGTH**—approximately five times greater than conventional "E-rings" of the same metal and thickness.
2. **HIGHER RPM LIMITS**—approximately 50% higher in most sizes.
3. **POSITIVE LOCKING IN THE GROOVE**—large corner radii or chamfers can be accommodated without separator washers.
4. **LOWER GROOVE COSTS**—because recommended groove tolerances have been increased, machining grooves for the series 5144 is less expensive.
5. **WIDER APPLICATION**—because series 5144 rings made of aluminum are stronger than conventional "E-rings" made of steel, the fastener may be used in applications where corrosion resistance or weight are factors.

Truarc Series 5144 Reinforced "E-rings" are available for shaft diameters from $\frac{3}{32}$—$\frac{7}{16}$ in. in carbon spring steel, stainless steel, beryllium copper, aluminum, and phosphor bronze. They are available stacked on rods for high speed installation with Truarc applicating and dispensing equipment.

As in all Truarc rings, you get statistically controlled quality from engineering and raw materials to the finished product. Complete selections are available from leading OEM distributors in 90 stocking points throughout the U. S. and Canada. Design Engineering Service is available to you. Send us your blueprints. Let our Truarc engineers help you solve design, assembly and production problems . . . without obligation.

SEND FOR FREE SAMPLES  **AND ENGINEERING DATA**

WALDES

TRUARC®

RETAINING RINGS

WALDES KOHINOOR, INC., LONG ISLAND CITY 1, N. Y.

Waldes Kohinoor, Inc., 47-16 Austel Place, L.I.C. 1, N.Y.

☐ Please send me sample Reinforced "E-rings." (please specify shaft size)_____

☐ Please send me Engineering Data Sheet

Name_____

Title_____

Company_____

Business Address_____

City_____ Zone_____ State_____

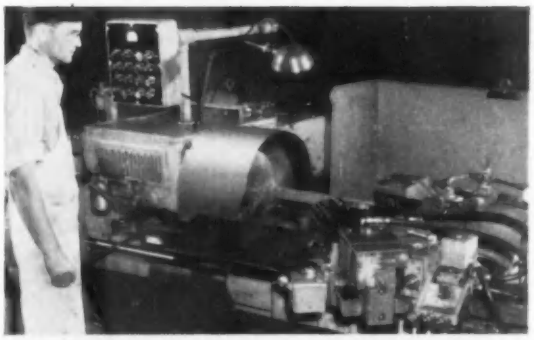
AY 090

Consult the Yellow Pages of Your Telephone Directory for Name of Local Truarc Factory Representative and Authorized Distributor. Look under "Retaining Rings" or "Rings, Retaining."

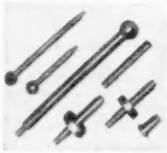
6 more cost cutting examples

show how SUNDSTRAND "Engineered Production" goes to work for you

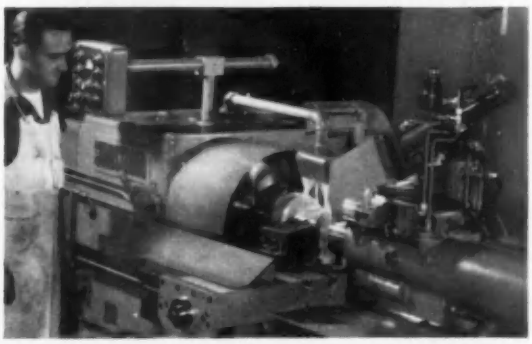
IN TURNING only the combination of "know-how" based on experience and the best machine for the specific job can give you lowest cost per piece. That's just what you get when Sundstrand "Engineered Production" is applied to your turning problems — a standard or special lathe that starts repaying its investment immediately.



SHORT RUN TURNING

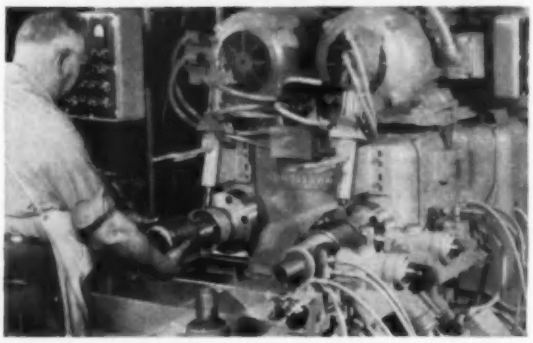


Shown at left are some typical parts turned on this single Sundstrand hydraulic tracer lathe. Production has increased approximately 80% over former methods on these short run jobs with fast set-up providing an important contribution to higher efficiency. Ruff, semi-finish, and finish cuts can be made in a single automatic cycle using just one template.

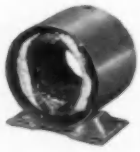


LONG RUN TURNING

Carbide turning of 22 heavy tool steel rock drill parts per hour on Sundstrand multi-tool automatic lathe uses unusual auxiliary third slide mounted on the tailstock that chamfers the end of the part. Tailstock center then supports work piece from this machined surface while front and rear slides move in to turn tapered end, face and chamfer.



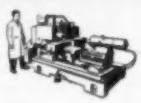
SPECIAL TURNING

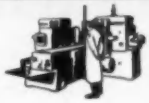
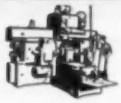
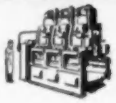


Where required by large volume of a particular part, Sundstrand designs and builds special equipment like this two spindle unit for turning stators for AC motors. Maximum production is insured because operator loads and unloads one station while work is being faced, bored and chamfered on both ends at the second station. Machine has flexibility for range of motor sizes.

SUNDSTRAND "Engineered Production" Service"

AUTOMATIC LATHES | SIMPLEX RIGIDMILS | DUPLEX RIGIDMILS | TRIPLEX RIGIDMILS | SPECIAL MACHINES

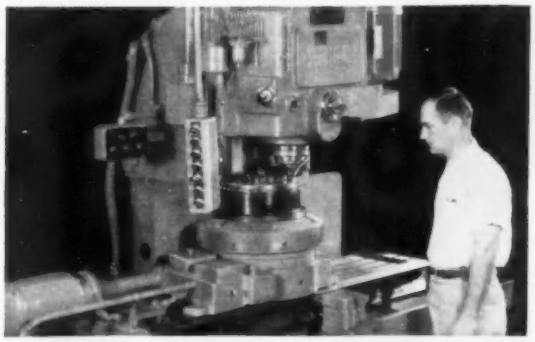


IN MILLING Sundstrand's unit construction gives you the opportunity of choosing from far more than the normal range of standard machines. The ideal combination of head, column, table and base can be provided in a standard machine; semi-standards are built up similarly at minimum cost. Even special machines can often be designed using standard components to cut costs.

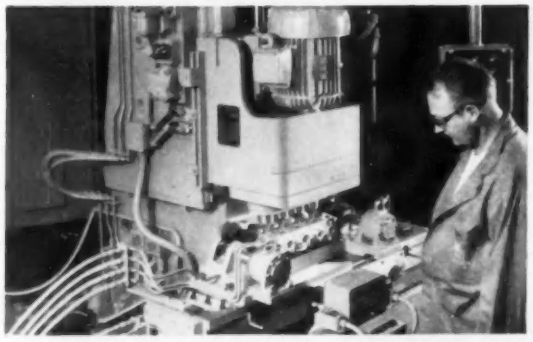
STANDARD RIGIDMILS

An 82% reduction in machining time resulted in changing over from the former method of milling 28 scallops in periphery of steel housing to a standard Sundstrand vertical head Rigidmil. Machine is also equipped with an automatic index base. Cycle is completely automatic except for loading and unloading of work holding fixture.



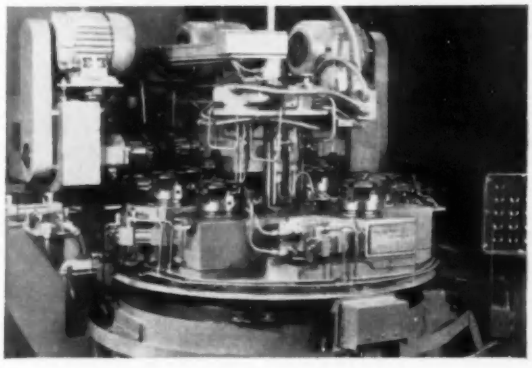
SEMI-STANDARD RIGIDMILS

Aluminum alloy cylinder head has four combustion chambers form-milled simultaneously on a semi-standard Rigidmil equipped with special 4-spindle vertical head. Vertical feed to head and longitudinal feed to table are timed and interlocked in automatic cycle. Operator only loads and unloads parts in the work holding fixture and presses cycle start button. Production is 85 pieces per hour.



SPECIAL MACHINES

Machine is equipped with three milling heads carried on a horizontally fed cross slide to mill six equally spaced slots in ring part at approximately 155 pieces per hour. Six indexing type work holding fixtures, each arranged to hold one part are mounted on the 48-inch diameter indexing table. Entire cycle is automatic except for loading and unloading work holding fixture.



Get details about how Sundstrand "Engineered Production" has provided answers on numerous production milling and turning jobs by writing for Bulletins 295 today. You can get the same expert help on your broaching and grinding problems, too.

SUNDSTRAND MACHINE TOOL CO.

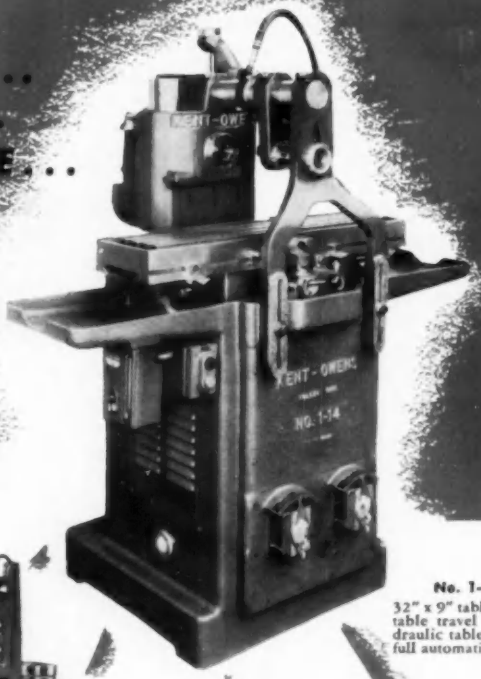
2571 ELEVENTH ST., ROCKFORD, ILLINOIS

BROACHING TOOLS | THREE WAY | SINGLE RAM | HORIZONTAL | DUPLEX RAM | PRESSES

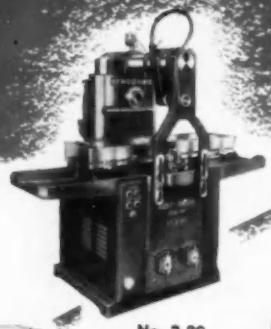
SUNDSTRAND "Engineered Production" Service

EXTRA RUGGED... SPEEDY... ACCURATE...

to Bring Down Milling Costs!



No. 1-14
32" x 9" table ... 14" table travel ... hydraulic table feed ... full automatic cycle.

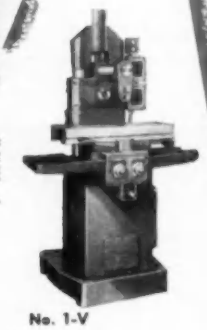


No. 2-20
20" table travel... 42" x 12" table.. fully automatic hydraulic table feed.

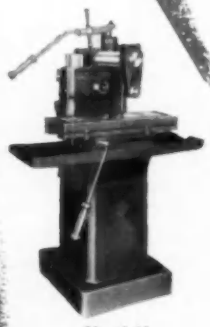
No. 1-14DS
Double Spindle for two milling operations at same time ... 14" table travel ... 32" x 9" table.

No. 2-20DS
Double Spindle for two milling operations at same time ... 20" table travel ... 42" x 12" table.

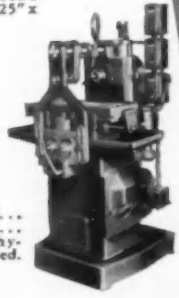
No. 2-20V
20" table travel... vertical spindle with speed range 32 to 1284 R.P.M. ... 42" x 12" table.



No. 1-V
Hydraulic vertical head feed ... 5½" head travel ... 25" x 9" table.



No. 1-M
Hand feed to table and head ...25" x 9" table ... Adjustable head counterbalance.



No. 1-8
8" table travel... 25" x 9" table... automatic hydraulic table feed.

STEP UP SPEED and ACCURACY!

Put the work on Kent-Owens Machines for top-speed milling and topmost accuracy to keep your costs at a minimum! Advanced features throughout these rugged machines make the difference . . . greater dependability . . . accuracy maintained in meeting tough production schedules. Twin-post head mounting assures balanced load. Greater cutting efficiency—only two gear contacts, motor to spindle. Write for bulletin #754 on wide range of hydraulic and hand-operated machines. Also, let Kent-Owens design and build your tooling and special machines. Kent-Owens Machine Co., Toledo, O.

KENT-OWENS
for milling machines

KENT-OWENS REPRESENTATIVES

BOSTON
General Machinery Corp.

BUFFALO
Beesley-Hofmann Mach'y Co.

CHICAGO
Four States Mach'y Company

CLEVELAND
Gorco Machinery, Inc.

DALLAS
Hunter Machine Tool Co.

DAYTON
C. H. Geniger Mach'y Co.

DETROIT
A. C. Habeckorn Mach'y Co.

FT. WAYNE
Ossis Machinery Co.

GRAND RAPIDS
Joseph Monahan & Co.

HAMILTON, ONT.
F. F. Barber Mach'y Company

HARTFORD
Harrington-Wilson-Dunn Corporation

HOUSTON
Oliver H. Van Horn Co., Inc.

INDIANAPOLIS
Ossis Machinery Co.

KANSAS CITY
Eichman Machinery Co.

LOS ANGELES
Machinery Sales Co.

MILWAUKEE
Four States Mach'y Company

MINNEAPOLIS
The Sutterlee Company

MOLINE
John J. Normoyle Co.

MONTREAL
F. F. Barber Mach'y Co.

NEW ORLEANS
Oliver H. Van Horn Co., Inc.

NEW YORK
Harrington-Wilson-Dunn Corporation

OMAHA
The Bulbech Co.

PHILADELPHIA
Calco Machinery Company

PITTSBURGH
Barney Machinery Company

ROCHESTER
F. W. Schiefer Machinery Co.

SAN FRANCISCO
Bolanti Machinery Co.

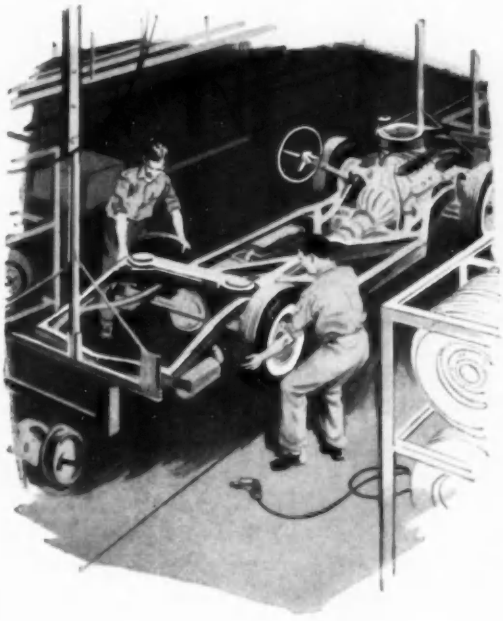
ST. LOUIS
Wm. Schoer Company

SEATTLE
Starbuck Machine Tool Co.

SYRACUSE
J. F. Owens Mach'y Company

TORONTO, ONT.
F. F. Barber Mach'y Company

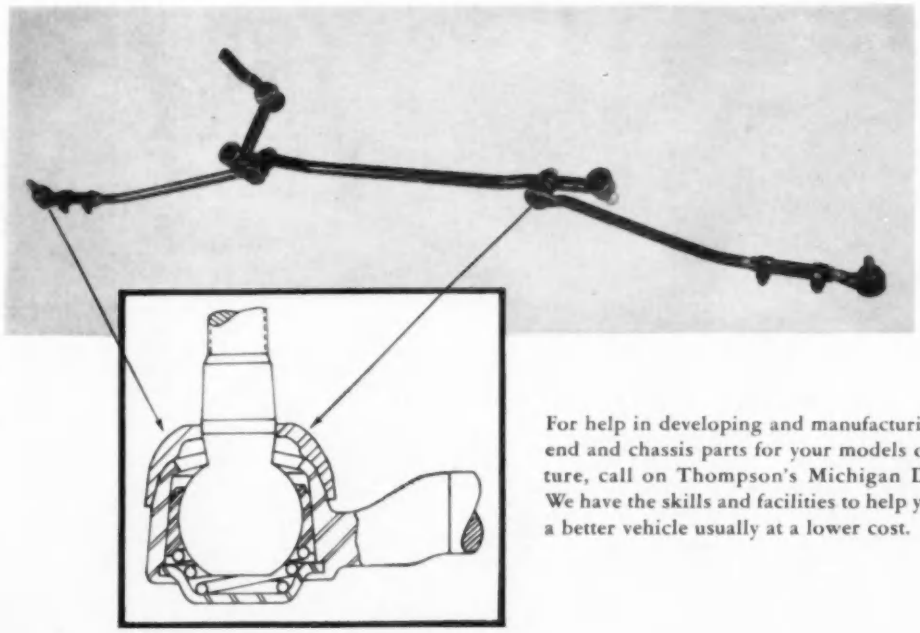
WINDSOR, ONT.
F. F. Barber Mach'y Company



New product from Thompson

GREASED-FOR-LIFE STEERING LINKAGE . . .

New developments in chassis and front end parts have been coming from Thompson's Michigan Division for many, many years. Almost every make of passenger car, truck, farm tractor or off-the-road vehicle performs better because of Thompson contributions. Shown here is another Thompson development ready now for manufacturers to use in models to come.



Completely assembled, GREASED-FOR-LIFE steering linkage for future passenger car application.

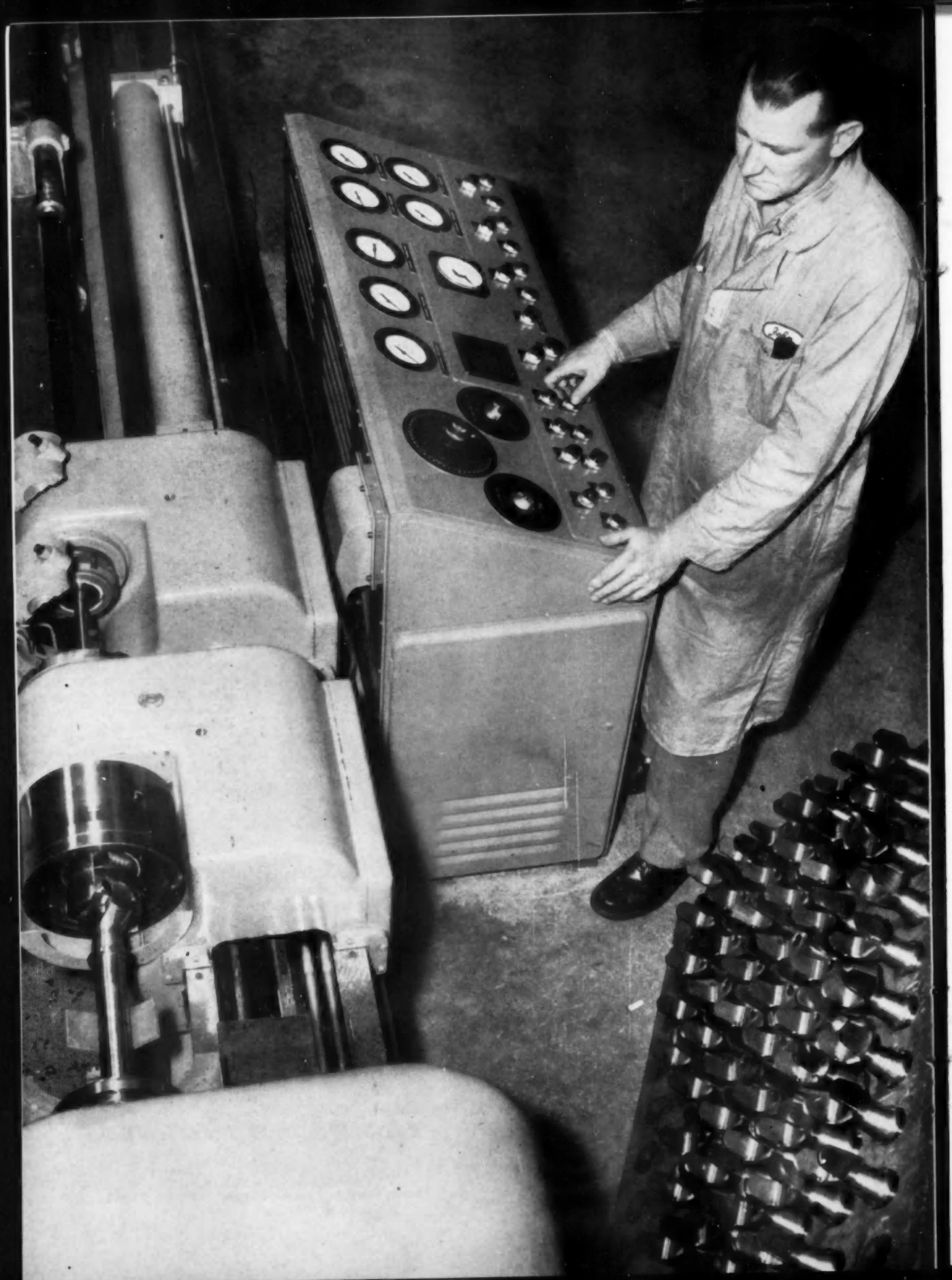
For help in developing and manufacturing front end and chassis parts for your models of the future, call on Thompson's Michigan Division. We have the skills and facilities to help you build a better vehicle usually at a lower cost.

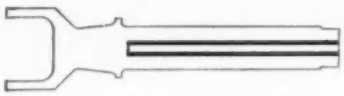
1—Provides constant take-up for wear.
2—Requires no lubricant.
3—Has excellent insulation qualities to reduce road noise transmission from running gear.
4—Exceptionally long life.

Thompson Products

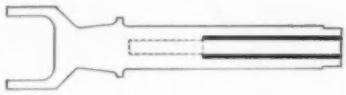
MICHIGAN DIVISION:

34201 Van Dyke • Warren, Michigan • JEfferson 9-5500

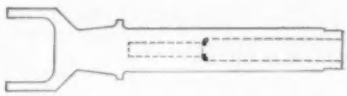




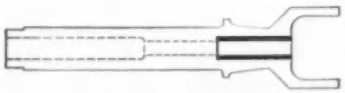
1. Solid bore—feed 5¾" per minute.



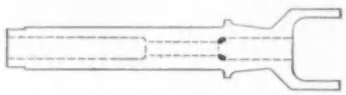
2. Counter bore—feed 8" per minute.



3. Form radius—feed 5¾" per minute.



4. Reverse part, solid bore—feed 5¾" per minute.



5. Form radius—feed 5¾" per minute.

6. Part finished accurate to ± .001" on length and concentricity, 25 to 30 micro-inches on finish! Part is forging, length 14⅞", 4130 steel, Rockwell 39 to 43-C.

This horizontal pin machined

8 TIMES FASTER . . .

on the Rapid Borer

Formerly, this aircraft part was rough drilled, reamed, radius formed, ground and honed. Operation called for turret lathe, grinder and honing machine. Even with experienced operators, incidence of spoilage was high because of precision requirements.

On the LeBlond-Carlstedt Rapid Borer, there is only one set-up. Part is completed, *finish bored* in 5 simple operations. Cycling is automatic. Workpiece spoilage is down. Operation is so simple that unskilled operators are quickly trained. Currently 2 different sizes are being produced in lots of 300 to 400.

LeBlond-Carlstedt Rapid Borers will solid bore, trepan or counterbore holes 3 to 8 times faster than by the conventional D-bit method! Hole capacity from 5/16" to 4¼" diameter. Handles symmetrical work—round, square, octagonal, tapered or stepped—wide variety of hole diameters and depths, work sizes. Available in three sizes, No. 15, No. 30 and No. 60.

Tell us about the holes you'd like to produce faster. Large holes or small. If the Rapid Borer can handle the job, you'll produce them faster than ever before. Write for Bulletin LC 501N.

LeBlond customer:

Peter J. Salmon Co., Glenside, Pa. Contract machining, specialists in high precision work. Semi-production machining, drilling, honing.

According to Peter J. Salmon, Owner, "*No machinery investment we've ever made has reduced our immediate costs as dramatically as the LeBlond-Carlstedt Rapid Borer. Actually, it competes cost-wise with any other holemaking method for holes as shallow as one inch. On longer holes there's no comparison! Not with the Rapid Borer, which can feed over 30" per minute!*"

THE R. K. LeBLOND MACHINE TOOL COMPANY

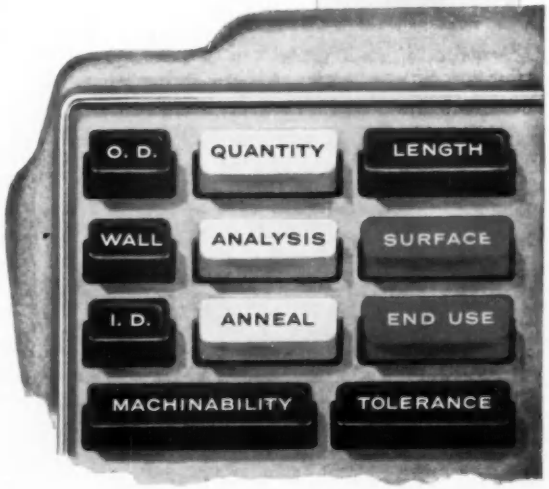
Cincinnati 8, Ohio

LeBLOND of Cincinnati

World's Largest Builder of a Complete Line of Lathes for more than 71 years

When you buy from Ohio Seamless

YOU PRESS THE BUTTON
OHIO SEAMLESS
DOES THE REST



Buying steel tubing from Ohio Seamless doesn't cost—it *pays*. Our minimum quantities are generally smaller than you may realize . . . often as small as 100 to 150 feet, in certain seamless grades and sizes.

When you buy from us, you're dealing with tubing *experts* . . . men who can recommend the *exact* Ostuco Tubing to suit your product and processes. There's no compromise on analysis, size, anneal, etc.

Advantages of buying from Ohio Seamless multiply, the closer you examine them. Our single-source service eliminates headaches of interplant shipments . . . possible errors . . . multiple purchase orders and invoices. Ohio Seamless keeps your production lines humming because you get *precisely what you want.*

For proof, contact our nearest sales office or the plant at *Shelby, Ohio—Birthplace of the Seamless Steel Tube Industry in America.*

AA-7118

SALES OFFICES: BIRMINGHAM • CHARLOTTE • CHICAGO (Oak Park) CLEVELAND • DAYTON • DENVER • DETROIT (Ferndale) • HOUSTON LOS ANGELES (Lynwood) • MOLINE • NEW YORK • NORTH KANSAS CITY PHILADELPHIA (Wynnewood) • PITTSBURGH • RICHMOND • ROCHESTER ST. LOUIS • ST. PAUL • ST. PETERSBURG • SALT LAKE CITY • SEATTLE TULSA • WICHITA

CANADA: RAILWAY & POWER ENGR. CORP., LTD.

EXPORT: COPPERWELD STEEL INTERNATIONAL COMPANY 225 Broadway, New York 7, New York

FIFTY YEARS
OSTUCO
OSTUCO TUBING
1908 1958

OHIO SEAMLESS TUBE DIVISION

of Copperweld Steel Company SHELBY, OHIO

Seamless and Electric Resistance Welded Steel Tubing • Fabricating and Forging

creative designing calls for an open mind

Leonardo da Vinci's design for a self-driven car

Scale model courtesy of IBM

EVEN DA VINCI'S SELF-DRIVEN CAR COULD HAVE BEEN BETTER WITH HELP FROM AN SKF ENGINEER.

When you receive the recommendations of an SKF engineer, you know they are in no way determined by possible restrictions in his product line. That's because the SKF line includes all four types of ball and roller bearings, in many thousands of sizes. This gives every SKF engineer the kind of flexibility he needs to keep an entirely open mind on any bearing problem. Give us your problem and see. 7858

Spherical, Cylindrical, Ball, and "Timken" Tapered Roller Bearings

EVERY TYPE—EVERY USE

SKF®

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.

®REG. U. S. PAT. OFF.

There is NO SUBSTITUTE for a forging: NO SUBSTITUTE for Wyman-Gordon Experience

There is more to the superiority of the forged crankshaft than just strength.

No other method of fabrication can compare with the forging process for dependability. The uniformity and predictability of physical properties with minimum variance from piece to piece or from one location to another in the same piece is assured to the greatest degree by modern forging practice.

Top automotive engineers agree that the use of a forged crankshaft permits the design of a more compact engine which is a decided advantage when thinking in terms of limited space available and overall engine weight reduction.

As compression ratios increase and engine outputs go up the risk factor must be reduced. Again, the uniformity of quality in the backbone of the engine, the crankshaft, is most essential and made possible only by a forging.

There is NO SUBSTITUTE for a forging and in a forging there is NO SUBSTITUTE for WYMAN-GORDON quality and experience.

WYMAN-GORDON COMPANY

Established 1883

FORGINGS OF ALUMINUM • MAGNESIUM • STEEL • TITANIUM

WORCESTER 1, MASSACHUSETTS

HARVEY, ILLINOIS • DETROIT, MICHIGAN

MURRAY WAY announces . . .

a practical, new idea in add-as-you-need-it, low cost, unitized, automatic polishing and buffing equipment!

IT PAYS FOR ITSELF!

- LOW CAPITAL OUTLAY.
- EXPANDS INEXPENSIVELY TO YOUR NEEDS.
- DOUBLES OR TRIPLES PRODUCTION.
- IMPROVES QUALITY—CUTS COST.
- REQUIRES ONLY 6′x8′ FLOOR AREA.
- ADJUSTABLE, AUTOMATIC OPERATION.

Murray-Way's years of specialized experience in automatic polishing and buffing equipment are at your service. The Junior Automatic is only one item in our line of standardized equipment for specialized applications. We invite your inquiries and special equipment problems.

Write today for detailed literature and prices.

A small automatic with "big" abilities. The Murray-Way Junior Automatic is designed to economically handle a few pieces or a large production. It's ideal for big or small plants.

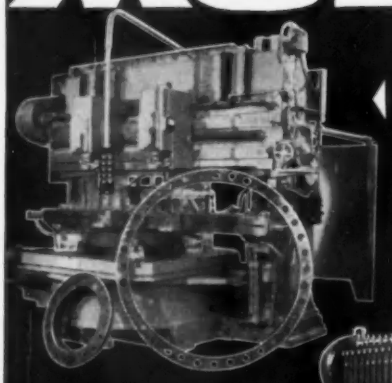
Available with basic equipment at a fraction of the cost of conventional automatic or semi-automatic buffing and polishing machines, the Junior Automatic can be equipped with standardized additional units, as-you-need-it, to handle practically any job in the place.

Adjustable heads available with vertical, horizontal and angle wheels or abrasive belts. Adjustable cycle and dwell. Automatic wheel lift-off and other features usually available only on bulky, expensive automatics.

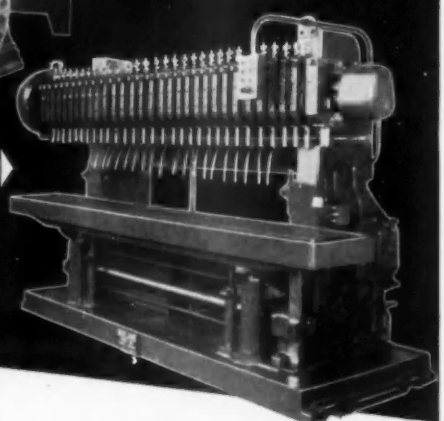
MURRAY WAY CORPORATION

P. O. BOX 189, MAPLE ROAD E. • BIRMINGHAM, MICH.

MOLINE



HD68 drills bolt circles from 12" to 100" diameter. Each of the two spindles has capacity for 2½" drill in steel. Operating cycle is fully automatic.

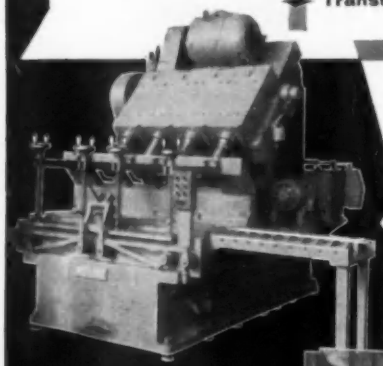


HD13 straight line-type drilling machine with capacity for thirty ¾" drills in steel. Used for work on heavy castings, round and rectangular steel tubes, structural shapes, plates and grader blade drilling or countersinking.

For Greater PRODUCTION . . . EFFICIENCY . . . SAVINGS

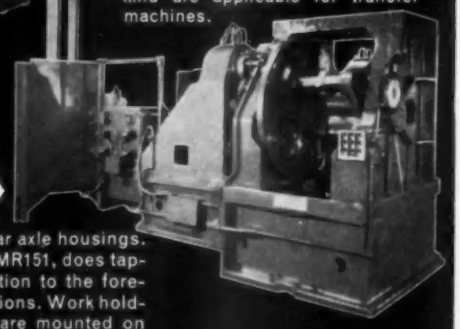
Use an individually designed "Hole-Hog" Machine Tool for such jobs as...

- Multi-Spindle Boring
- Single and Multi-Spindle Honing
- Straight Line Multi-Drilling
- Adjustable Spindle Drilling
- Vertical and Way-Type Fixed Center Drilling, Boring and Tapping
- Transfer-Type and Special Machines



OVER 57 YEARS OF MACHINE TOOL ENGINEERING EXPERIENCE IS AT YOUR SERVICE. TELL US YOUR PARTICULAR PROBLEM

13CB hydraulic feed cylinder boring machine. V-8 engine blocks are rough and finish bored for wet-type cylinder sleeves. Units of this kind are applicable for transfer machines.



MR152 performs drilling, reaming, spot facing and chamfering operations on tractor rear axle housings. A companion machine, MR151, does tapping in addition to the foregoing operations. Work holding fixtures are mounted on power driven trunnion.

MOLINE TOOL CO. MOLINE, ILLINOIS

MOLINE TOOL COMPANY

REPRESENTATIVES IN PRINCIPAL CITIES

100 20TH STREET • MOLINE, ILLINOIS

109

CALENDAR

OF COMING SHOWS AND MEETINGS

Society of British Aircraft Construction, flying display and exhibition, Royal Aircraft Establishment, Farnsborough, England ..... Sept. 1-7

International Conference on Peaceful Uses of Atomic Energy Geneva, Switzerland ..... Sept. 1-13

American Petroleum Institute, Oil Information Committee, meeting, Hotel Statler, Boston, Mass. ..... Sept. 3-5

International Conference on Air Pollution, sponsored by ASME, Hotel Statler, New York, N. Y. Sept. 4-5

International Aviation Show, Coliseum, New York, N. Y. ..... Sept. 6-14

SAE National Farm, Construction, and Industrial Machinery Meeting, Milwaukee Auditorium, Milwaukee, Wis. ..... Sept. 8-11

First International Congress of Aeronautical Sciences, Palace Hotel, Madrid, Spain ..... Sept. 8-13

Second International Congress on Air Pollution, sponsored by ASME, Hotel Statler, New York, N. Y. ..... Sept. 9-10

National Petroleum Association, 56th annual meeting, Hotel Traymore, Atlantic City, N. J. Sept. 10-12

Process Industries Conference sponsored by ASME, Hotel Statler, Buffalo, N. Y. ... Sept. 15-17

Instrument-Automation Conference, 13th annual meeting, sponsored by Instrument Society of America, Convention Hall, Philadelphia, Pa. ..... Sept. 15-19

National Industrial Conference Board, annual marketing conference, Waldorf-Astoria Hotel, New York, N. Y. ..... Sept. 17-19

ASME Petroleum Division Conference, Hotel Cosmopolitan, Denver, Col. ..... Sept. 21-24

Steel Founders' Society of America, fall meeting, The Homestead, Hot Springs, Va. ... Sept. 22-23

Material Handling Institute, Inc., fall meeting, The Greenbrier, White Sulphur Springs, W. Va. Sept. 22-24

Standards Engineers Society, 7th annual meeting, Benjamin Franklin Hotel, Philadelphia, Pa. ..... Sept. 22-24

Seventh Annual Conference on Industrial Electronics, Rackham Memorial Building, Detroit, Mich. ..... Sept. 24-25

Pressed Metal Institute, annual meeting, The Cloisters, Sea Island, Ga. ..... Sept. 28-Oct. 2

SAE National Aeronautic Meeting, Production Forum, and Aircraft Engineering Display, Ambassador Hotel, Los Angeles, Calif. ..... Sept. 29-Oct. 3

ASTE Semi-Annual Meeting and Western Tool Show, Shrine Exposition Hall, Los Angeles, Calif. ..... Sept. 29-Oct. 3

Fourth Joint Military-Industrial Packaging and Materials Handling Symposium, sponsored by Dept. of Navy, Washington, D. C. ..... Sept. 29-Oct. 5

IBM'S PROBLEM:

Plate many different small parts *without mixing!*

UDYLITE'S ANSWER:

CLUSTER BARRELS... for faster, greater production!

At the International Business Machines Corporation, Electric Typewriter Division plant, at Lexington, Ky., many different small parts had to be plated and processed uniformly . . . without mixing. Conventional methods proved too slow, costly and inaccurate. Then, IBM discussed the problem with Udylite.

Out of this discussion came the Udylite Cluster Barrel—developed specifically for the plating and processing of many different minute parts simultaneously . . . *and doing it without mixing!*

Also, because of the gentle tumbling action of the work in each barrel, IBM is now able to plate tiny, fragile parts that heretofore had to be racked, thus saving thousands of dollars each year.

And, the excellent agitation of the solution that results from the orbit struck by each barrel, plus the definite replenishing of the solution makes the Udylite Cluster Barrel the ideal answer for such a problem.

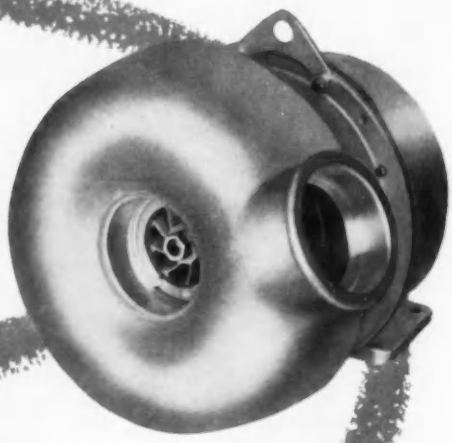
In addition to the multiple cluster illustrated, Udylite now offers 12, 8 and 4 barrel units for plating any number of small and medium sized parts. These cluster combinations are indispensable for anyone engaged in the production plating or processing of business machines, radios, electrical and electronic items.

If processing of small batches or volume plating *without mixing* is a problem in your shop contact your local Udylite salesman now. He can show you how Udylite Cluster Barrels can be *your* answer, too! Call him today or write direct to:

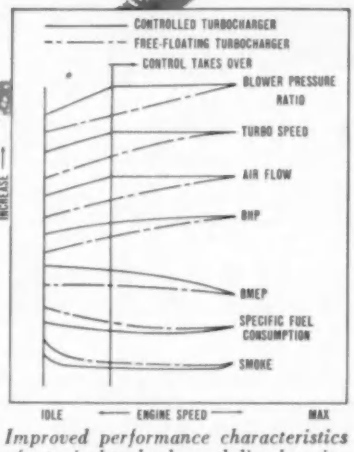
the **udylite** corporation

detroit 11, michigan • world's largest plating supplier

NOW!
CONTINUOUS, FULL POWER TURBOCHARGING



AiResearch control system keeps turbocharger output at ideal level



Improved performance characteristics of a typical turbocharged diesel engine equipped with the new AiResearch Turbocharger Control System.

Accurate control of turbocharger speed over its complete range regardless of changing load characteristics has been achieved with the new AiResearch Turbocharger Control System. This automatic control system delivers more air to the engine when needed and greatly increases torque rise, giving turbocharged diesel engines greater lugging ability when operating under heavy loads. By contrast, free-floating turbochargers operate at reduced RPM when the engine is working at below-maximum engine speed.

This improved air delivery system greatly increases the acceleration, for example, of turbocharged diesel trucks up steep grades. In a typical case, the round-trip time of a trucking company operating between Phoenix and Denver was cut from 48 hours to 42 hours. Over short hauls an off-the-road truck cut its 27-minute round-trip time to 18 minutes. Comparable gains are made for all types of turbocharged diesel equipment, stationary or mobile.

The two components of the new control system are a pressure ratio sensor and an exhaust by-pass valve. They control the speed of exhaust-driven turbochargers by modulating the amount of engine exhaust used. This eliminates overspeeding of the turboblower, and at the same time provides higher turboblower speed while lugging. Smoking is virtually eliminated under all conditions.

Your inquiries are invited.

THE GARRETT CORPORATION

AiResearch Industrial Division

9225 South Aviation Blvd., Los Angeles 45, California

DESIGNERS AND MANUFACTURERS OF TURBOCHARGERS AND SPECIALIZED INDUSTRIAL PRODUCTS

"...AND WEIRKOTE® CAN DO AWAY WITH PLATING OR DIPPING AFTER FABRICATION! IT WON'T PEEL OR FLAKE."

Q. A zinc-coated steel that won't peel or flake? That could save us a lot of money every month. Just what makes this Weirkote so special?

A. It's made by the continuous process, you know, which integrates zinc and steel so that the toughest fabrication won't break down the bond. You can work Weirkote to the very limits of the steel itself.

Q. Of course, that means the most complicated parts would have protection against rust. I like what I'm hearing. Is there more?

A. Yes . . . now Weirkote is treated to inhibit wet storage stain (white oxide). To make a long story short, I'd say this: With Weirkote, you can turn out a better product at lower cost. And you can free a lot of the capital, floor space and time you have tied up in plating operations.

Send for free booklet that details the time- and cost-saving advantages of skin-tight zinc-coated Weirkote. Weirton Steel Company, Dept. T-7, Weirton, West Virginia.

WEIRTON STEEL COMPANY

WEIRTON STEEL COMPANY

WEIRTON, WEST VIRGINIA

a division of

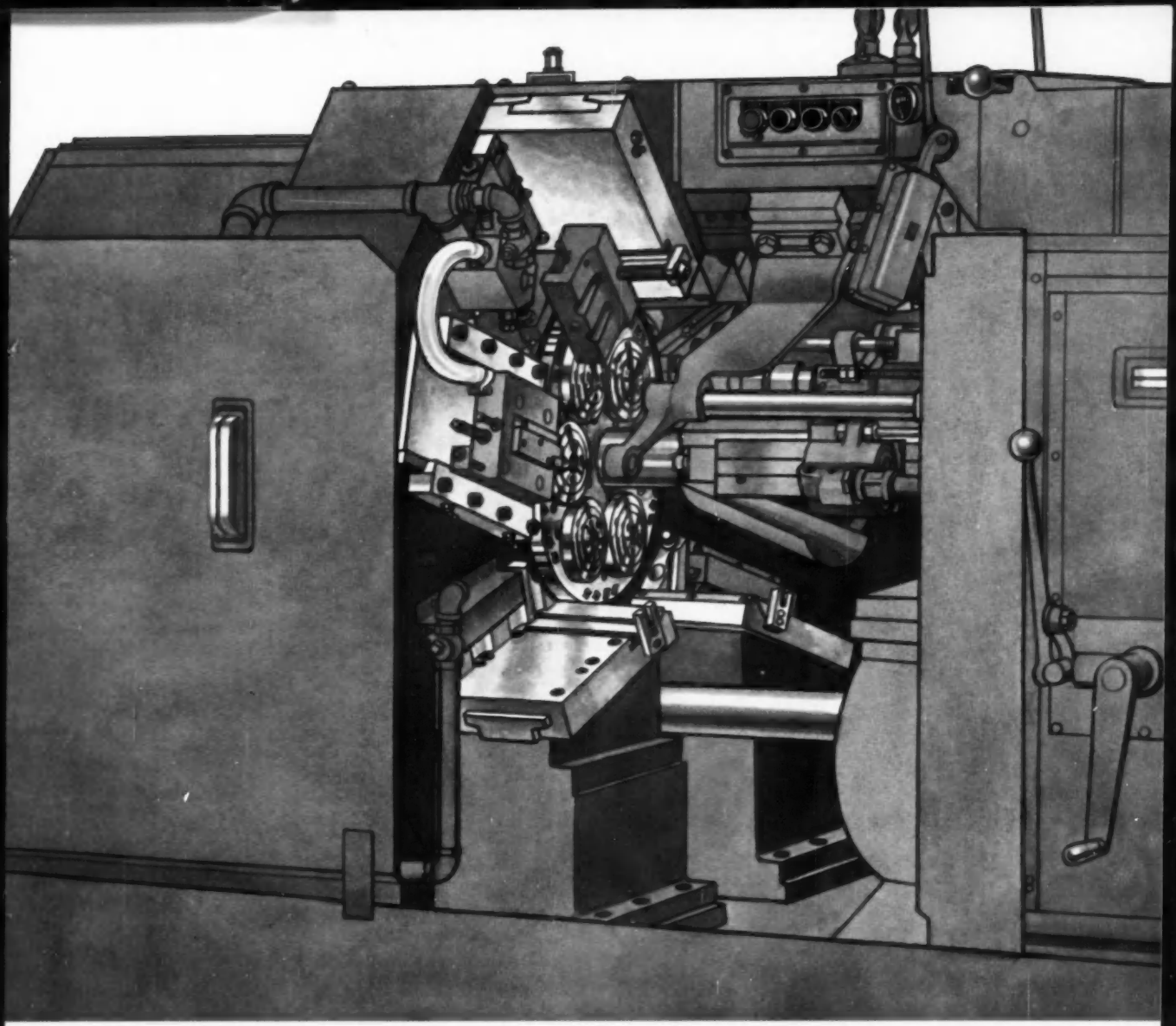
NATIONAL STEEL CORPORATION

This is the new

MODEL

52

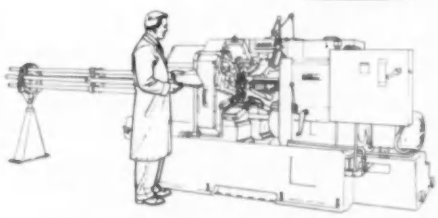
NEW BRITAIN



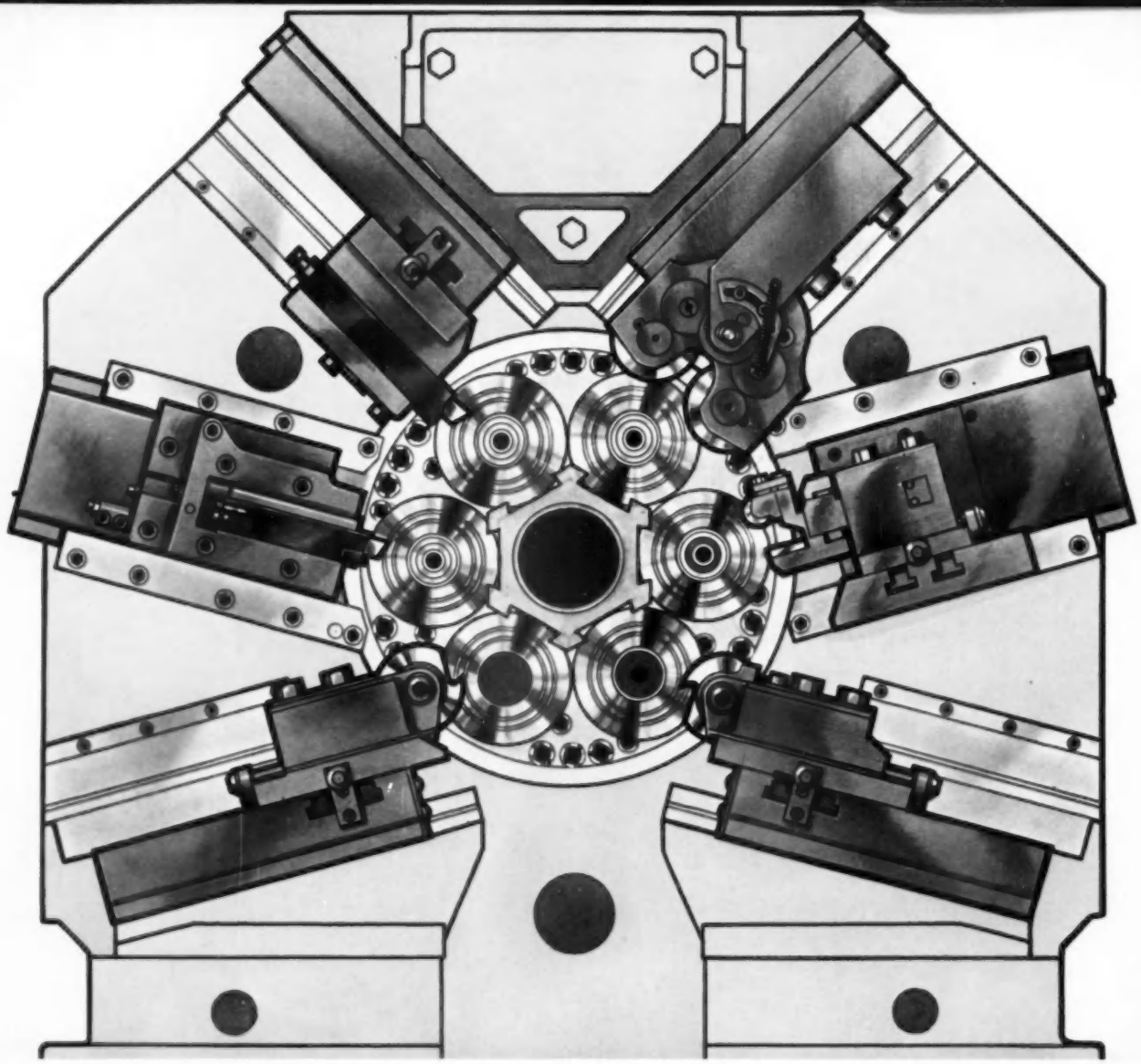
for New Britain accuracy in the 1" and 1¼" range

The new Model 52 gives you every feature of the most modern bar machine design.

Six independent radially-operated cross slides · Spindle speed range of 271-4249 r.p.m. · Spherical roller collet closing mechanism · Automatic stop · More efficient spindle spacing · Greater tooling area accessibility · Positive locating and locking of spindle carrier · Wear-preventing spindle carrier lifting mechanism. Turn the page for more information. The New Britain Machine Company, New Britain-Gridley Machine Division, New Britain, Connecticut.

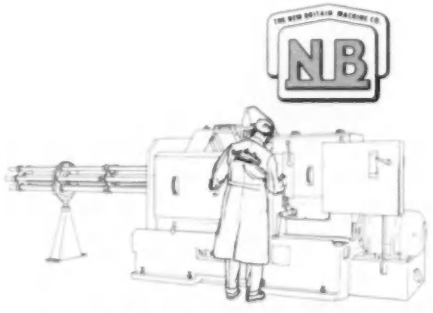


MODEL **52** NEW BRITAIN AUTOMATIC BAR MACHINE



more operations with a cross slide in every position

The New Britain 52-62 Series automatic bar machines offer you the advantages of a cross slide for every spindle, permitting practically unlimited tooling combinations. Completely independent of each other, and solidly mounted on the frame of the machine, these six cross slides permit more operations on a single machine with simpler tools and attachments. The readily accessible cross-slide cams permit more rapid change-over, too. The New Britain Machine Company, New Britain-Gridley Machine Division, New Britain, Connecticut.



MODEL **62** NEW BRITAIN AUTOMATIC BAR MACHINE
1⅝" and 2¼"

This is an ideal time to have new-machine accuracy rebuilt into your New Britains by New Britain

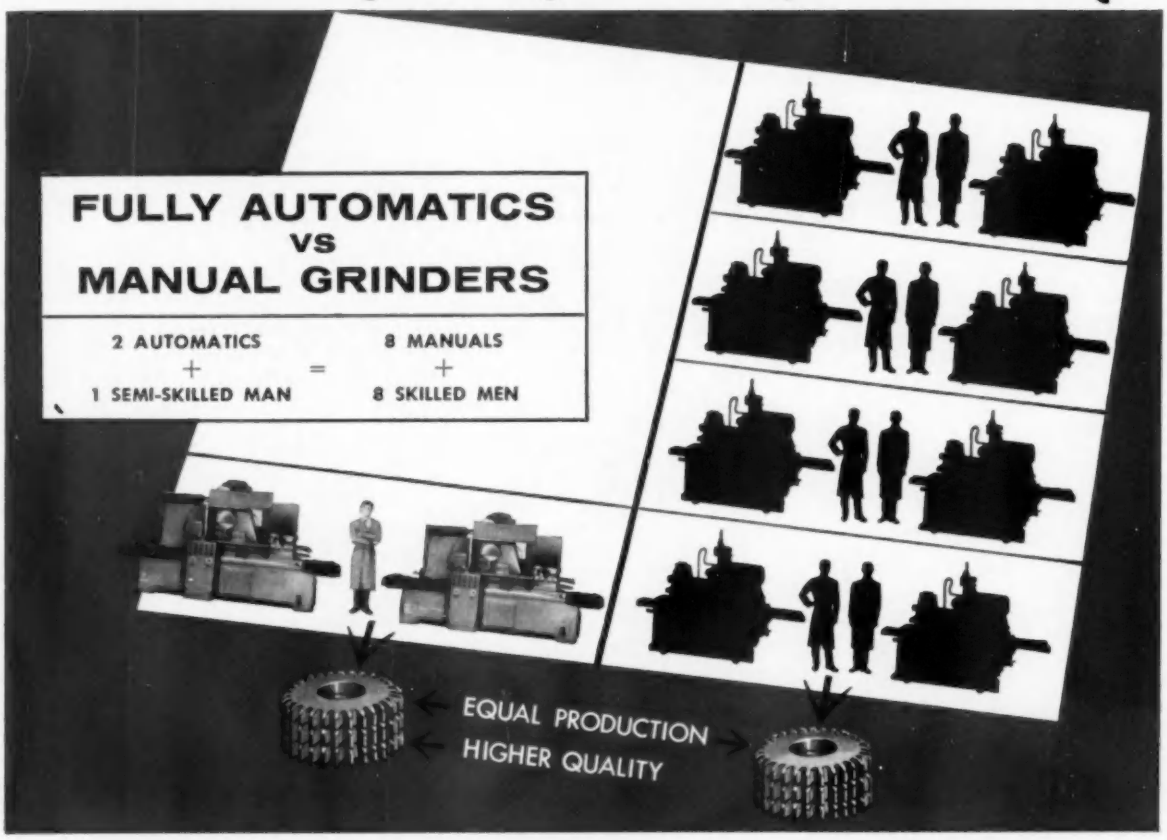
Ruggedness and dependability have been built into every New Britain machine ever sold. For a fraction of the replacement cost you can have your older New Britains restored to new-machine accuracy. Rebuilding eliminates the high cost of frequent shutdowns and returns the machine to full efficiency, performing every operation it was designed to perform.

At New Britain your machines will be rebuilt with the same production facilities that originally built them. Established reconditioning procedures, based on long experience, will put your rebuilt machines back on the line in the shortest possible time. Wherever possible, your machine will have the benefits of the newest improvements in parts and assemblies.

With New Britain your rebuilt machines carry a new-machine warranty.

Your New Britain field engineer or sales representative will help you determine the rebuilding program best suited to your needs. Call him, or write or phone the factory direct, c/o Service Sales Manager, The New Britain Machine Company, New Britain-Gridley Machine Division, New Britain, Connecticut.

Precision gear grinding economy



—Plus this 4-way versatility

Choose from any of these cycles with selective feed increments:

1 Rough grinding
2 Rough grind; finish grind
3 Rough grind; semi-finish grind; finish grind
4 Manual grind

50th ANNIVERSARY—1908-1958

GEARGRIND Detroit

UP TO 36" P.D.

GEAR DATA

No. Teeth	96
Pitch Diameter	26.7"
Diametral Pitch	3.6
Pressure Angle	25°
Face Width	4.5"

FLOOR TO FLOOR PRODUCTION TIME

Single Gear/Arbor	55 min/gear
Two Gears/Arbor	33 min/gear

GEAR ACCURACY

Involute Profile	Within .0002"
Tooth to Tooth Spacing	.0003" max.
Runout of Pitch Diameter	.0006" total
Lead Error	Less than .0001"/"

For all the facts—write today!

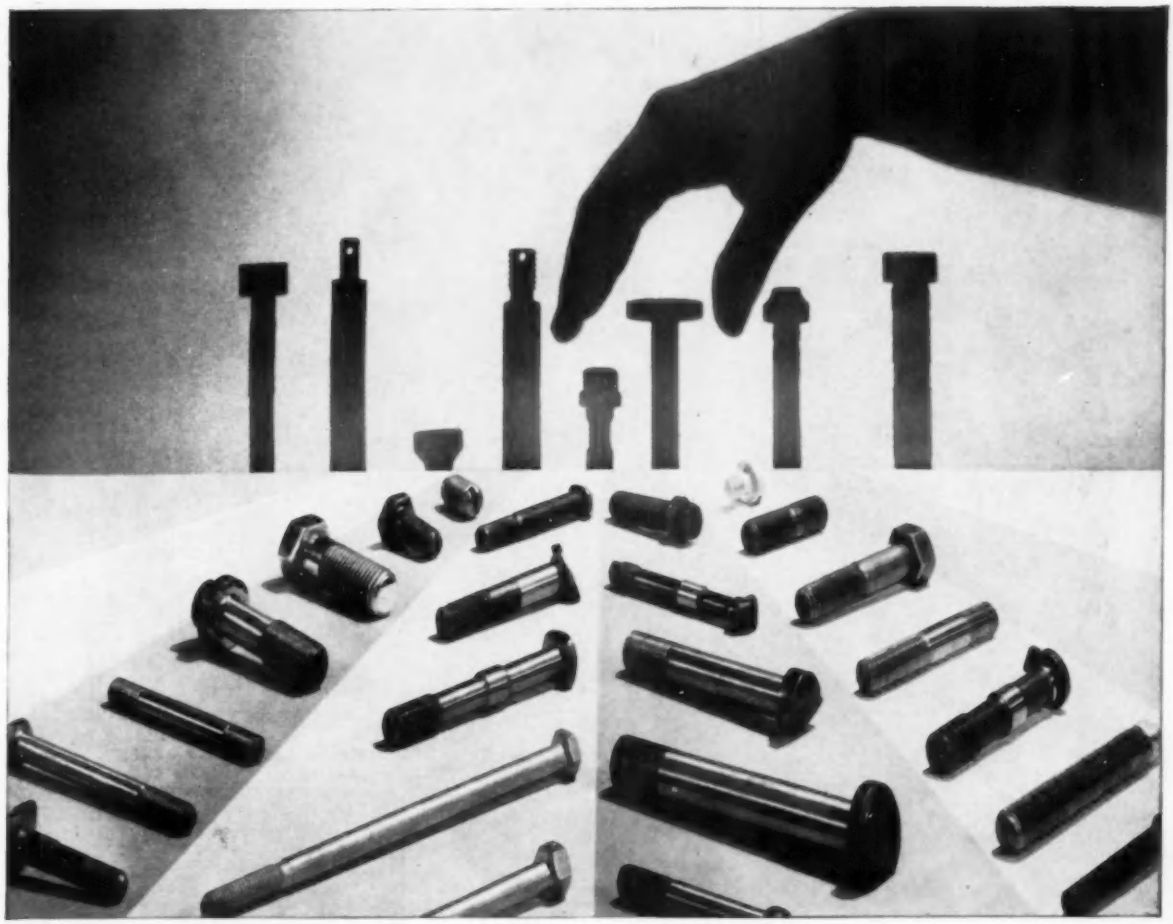
THE GEAR GRINDING MACHINE COMPANY

3903 Christopher, Detroit 11, Michigan

Manufacturers of:

The Detroit Screwmatic 750, Automatic Screw Machine.
RZEPPA ("Sheppa") Constant Velocity Universal Joints

58-MTSA



IMPROVE DESIGN . . . get assistance

from Ferry Cap—fastener experts for 50 years

Often we can suggest a fastener of special shape that will reduce your over-all product costs. Sometimes these special screws eliminate parts, replace more expensive parts, or reduce assembly time. Frequently they improve product performance. In all cases, Ferry Cap customers get the benefit.

Give us a call and have a talk with one of our "Fastener Engineers."

THE FERRY CAP & SET SCREW COMPANY

Makers of the famous Counter-Bor® Screw for socket head applications.

2191 SCRANTON ROAD • CLEVELAND 13, OHIO

FERRY CAP *is geared to FASTER SERVICE*

NEW! Simpler housing and one-piece bearing reduce maintenance on Thompson Turbocharger

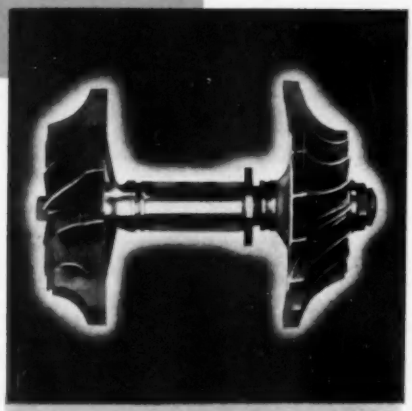
Designed for 10,000 operating hours under the severest operating temperatures and speeds. This means longer revenue runs between scheduled maintenance of the unit, and fewer unscheduled downtimes for repairs.

Turbine housing of the new Thompson Turbocharger is a heat-resistant alloy designed to eliminate corrosive attack and to be free from service cracks. Design also isolates high-temperature exhaust drive from bearing and air-side of turbocharger to increase maintenance-free life.

Bearing is one-piece design, mounted on small diameter shaft to reduce bearing surfaces speed even at high rpm.

Design of impeller supplies supercharging air at equal compression ratios over a larger flow range and at lower rotor speeds than other turbochargers. Light-alloy rotor provides instant response to changes in engine speed and load.

Your blown diesel engines up to 300 horsepower can be readily equipped with new-design Thompson Turbochargers. Our engineers will help. When may they call?



Write today on your company letterhead for Booklet AI-958 which contains technical data on Thompson Turbochargers for blown diesel engines up to 300 horsepower.

TAPCO GROUP
Thompson Products, Inc.
CLEVELAND 17, OHIO

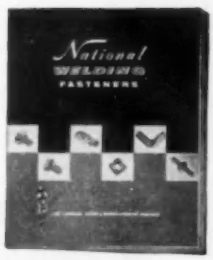
"NAT" KNOWS

WELDING FASTENERS

Standard or special, "Nat" can tell you all about projection welding fasteners. National's complete, high quality line of standard weld screws, pins and nuts gives you maximum strength and 100% optimum welds . . . even on materials .030 to ¼ inch thick.

Bring your welding fastener problems to National. Besides offering a satisfactory solution, we will design any *special* welding fastener you may need.

Write for *National Welding Fasteners* catalog. It shows "Nat's" complete welding line.

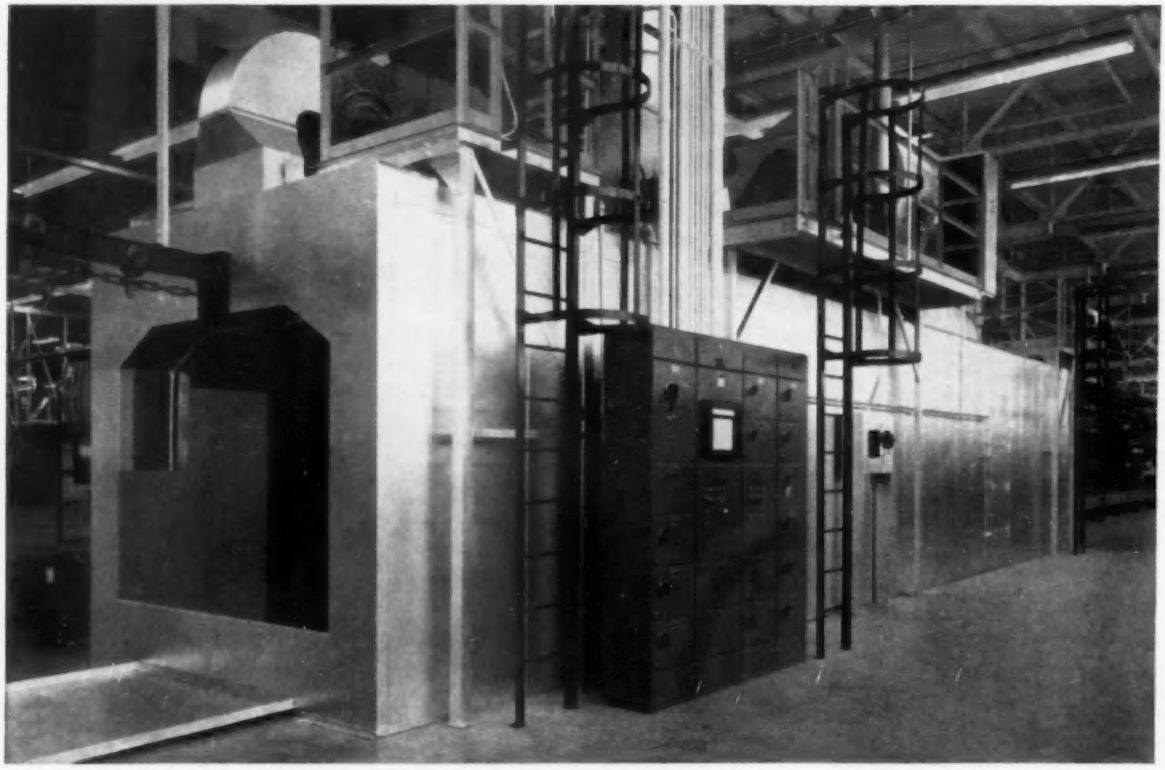


THE NATIONAL SCREW & MFG. COMPANY
CLEVELAND 4, OHIO
Pacific Coast: National Screw & Mfg. Co. of Cal.
3423 South Garfield Ave., Los Angeles 22, Cal.

National PRODUCTS

Fasteners Hodell Chains Chester Hoists

FINISHING SYSTEMS...



MODERN PRODUCTION FINISHING METHODS Require ULTRAMODERN FINISHING EQUIPMENT!

The function of the modern Dry-Off Oven, pictured above, is to thoroughly dry metal parts after passing through the Cleaning and Rust Proofing Machine in a Complete Mahon Finishing System installed in an Automobile parts plant.

When you have a finishing problem, you, too, will want to discuss methods, equipment requirements and possible production layouts with Mahon engineers . . . you'll find them better qualified to advise you, and better qualified to do the initial planning and engineering which is so vital to a properly coordinated production finishing system.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

SALES-ENGINEERING OFFICES in DETROIT, NEW YORK and CHICAGO

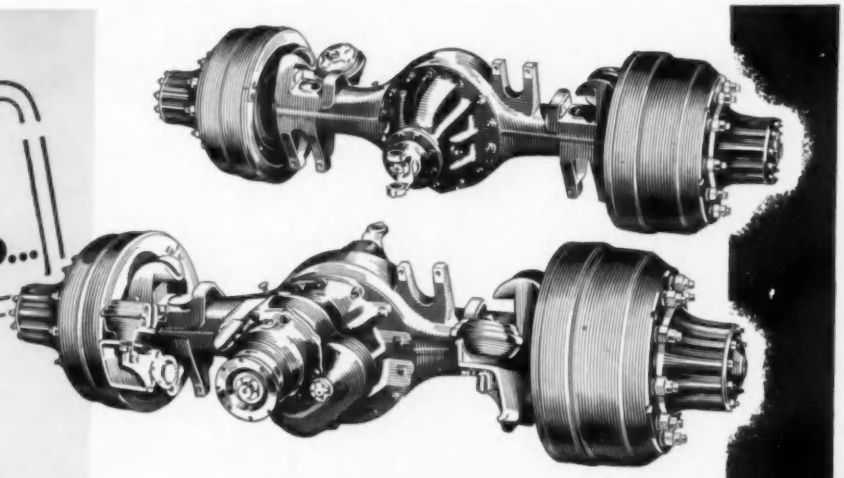
Engineers and Manufacturers of Complete Conveyorized Finishing Systems; Metal Parts Washers, Metal Cleaning and Rust Proofing Machines, Conveyorized Cleaning and Pickling Machines; Dry-Off Ovens, Cooling Tunnels, Spray Booths, Electrostatic Spray Enclosures, Flow Coaters, Dip Coaters, Finish Baking Ovens, and Paint Stripping Equipment; Core Ovens, Soldering Ovens, Heat Treating and Quenching Equipment for Aluminum and Magnesium; Dust and Fume Control Installations, and Many Other Units of Special Plant and Production Processing Equipment.

See Sweet's Plant Engineering File for Information and Representative Installations, or Write for Catalogue A-658

. . . the **EXPERIENCE** that goes into the **PLANNING** and **ENGINEERING** of **MAHON EQUIPMENT** is the item of **GREATEST VALUE to YOU!**

MAHON

PROVED AND PREFERRED...



For three years..

Timken-Detroit® Lightweight Driving Tandems—First Choice With Big Over-the-Highway Operators!

These superior features make the difference:

Lighter than any comparable tandem on the market . . . but a real heavyweight when it comes to service. Besides increased payloads you get long, trouble-free service and lower operating costs. Time-proved, Timken-Detroit Lightweight tandem features include:

Driver Controlled Inter-Axle Differential. Torque is divided equally between axles, yet wheels of one axle can turn faster or slower than wheels of other axle. This means both axles are always doing equal amounts of work. Driving parts and tires last longer.

"In-Line" Propeller Shaft Drive. With straight-through drive, bearing and gear life is greatly increased because universal joint working angles are materially reduced.

Torsion Flow Axle Shafts. More splines, plus greater root and body diameter, add extra strength.

Hot Forged Rectangular-Shaped Axle Housings. Rectangular shape, combined with full strength corner sections, provides the greatest strength with minimum weight and size. Welded on bowl cover prevents leakage.

Hypoid Gears. Larger pinions and greater tooth contact give 30% more torque capacity, top efficiency and long life . . . plus lower maintenance costs.

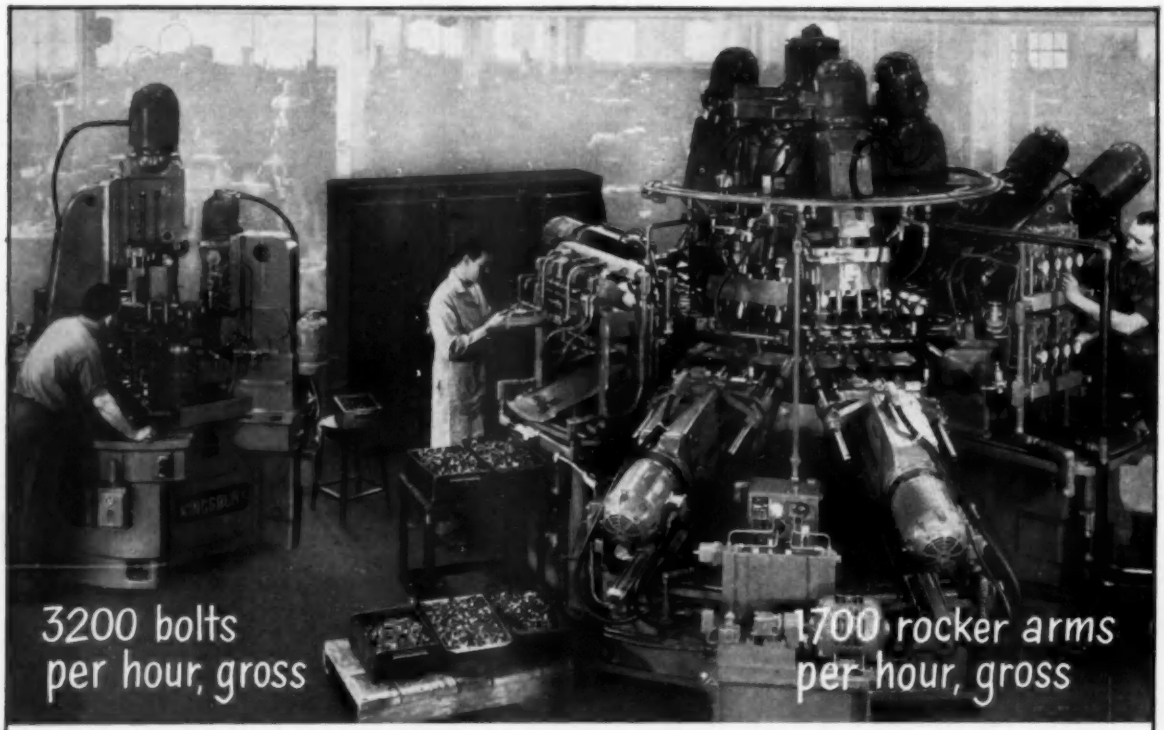
Unmatched Parts Interchangeability. Most of the wearing parts—gears, bearings, shafts, differentials, brakes—are interchangeable with parts from Timken-Detroit standard single axles. Parts are readily available and less expensive.

WORLD'S LARGEST MANUFACTURER OF AXLES FOR TRUCKS, BUSES AND TRAILERS

TIMKEN Detroit AXLES
ROCKWELL-STANDARD CORPORATION
TRANSMISSION AND AXLE DIVISION
DETROIT 32, MICHIGAN
Accepted D A Standard
TRADE MARK REGISTERED

©1958, R-S Corp.

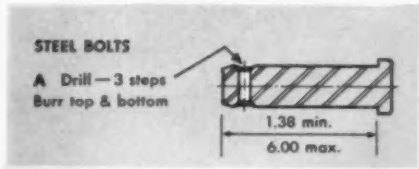
Products of **ROCKWELL-STANDARD** Corporation

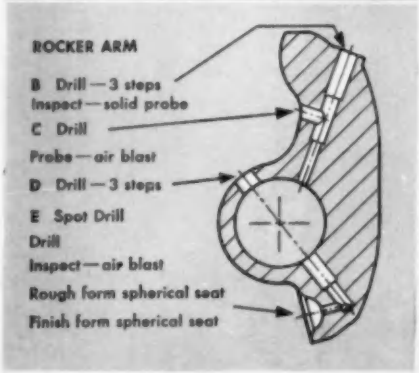


On the left — a ten-spindle Kingsbury. It completes two bolts every 2.2 seconds (including indexing). The big unit has a three-spindle auxiliary head and drills hole A in three steps at three stations. Each small unit has an underneath attachment and burrs one part top and bottom. Parts are ejected onto a chute between these burring units.

On the right — a 56-spindle Kingsbury with center column. It completes four rocker arms every 8.5 seconds (including indexing). All units have four-spindle auxiliary heads with oil mist lubrication. Units on the center column operate on hole B. Units on knees around the base work downward on holes C and D and upward on hole E. The units for hole E have hydraulic slides for more efficient changing of tools.

...talk about high production!





These two Kingsburys have extremely high production rates because they (1) operate on more than one part at a time, (2) have short time cycles by drilling in steps, and (3) automatically clamp, unclamp and eject onto chutes. The machines are on our assembly floor ready to ship. The customers have approved test samples.

One machine is fairly simple, the other complex. But both will continue to produce good parts month after month because they have good basic design and rugged, accurate construction.

LOWER PRODUCTION RATES

Most Kingsburys produce at rates of 200 to 600 parts per hour. We design each one to meet the customer's requirements. On most machines each fixture holds only one part. Many have manual clamping.

For 38 years we have built machines that our customers don't worry about. May we do the same for you? Kingsbury Machine Tool Corporation, Keene, New Hampshire.

KINGSBURY

The little booklet on alloy steels that grew into a textbook . . .

Quick Facts about Alloy Steels appeared for the first time in 1956, as a collection of reprints of a series of Bethlehem advertisements in metalworking magazines.

The small booklet was well received, and we kept adding more of the informative advertisements as we reprinted it to keep up with demand. Today, it has grown to 40-page size, and is in its Third Edition. More than 20,000 booklets have been distributed at the written request of executives, engineers, designers, and others, who have found *Quick Facts* to be an authoritative small textbook on the fundamentals of alloy steels. Here's what a U. S. Navy engineer wrote:

"*Quick Facts* is a small textbook of information—a booklet that has been needed for a long time. One of my associates and I had a metallurgical problem involving alloy steels. We just didn't have the information. A friend showed me a copy of your booklet *Quick Facts*, and there on one page, under the subject 'Determining Depth Hardness,' was just what we wanted to know!"

The current booklet contains reprints of the complete series of advertisements, on such subjects as, "What is an Alloy Steel?" "Effects of Elements," "Grain Size," "Heat-treatment," "Quenching Media," and others. It's written in concise, layman's language, from data compiled by Bethlehem's metallurgical engineers.

Would you like a copy of the *Quick Facts* booklet? Just fill out and send in the coupon.

PUBLICATIONS DEPARTMENT, ROOM 1030
BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

Please send me your "Quick Facts about Alloy Steels" booklet.

*NAME*_____

*COMPANY*_____

*ADDRESS*_____

*CITY*_____ *STATE*_____

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA. On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

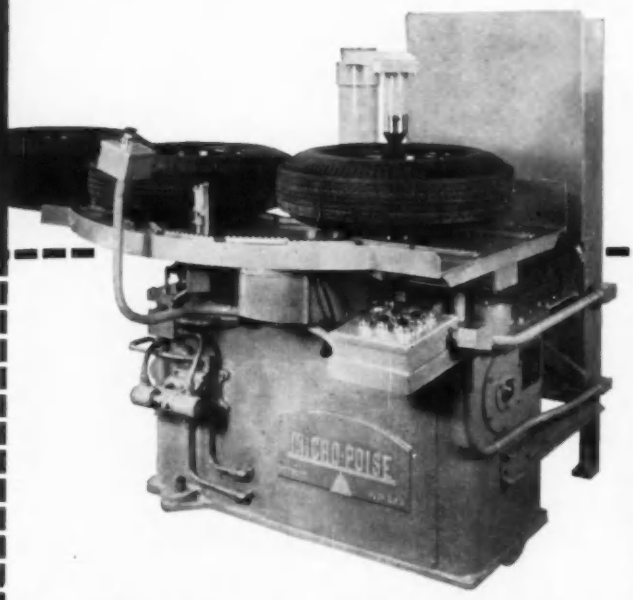
NEW SUSPENSION TECHNIQUES REQUIRE

Production WHEEL BALANCING

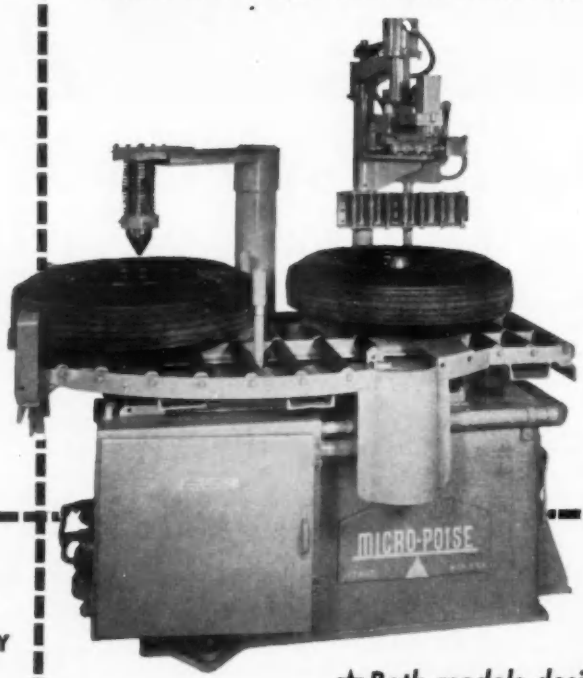
The merits of well balanced tire and wheel assemblies have long been recognized in the manufacture of luxury cars.

Now new and better suspension methods have pointed up the need for good wheel balance in *all* cars.

Two new Micro-Poise balancing machines, developed especially for the high production needs of the automobile industry, are helping manufacturers economically to extend what was once a luxury car feature to high volume models.



★ *(Above)* **Semi-automatic machine takes pieces from a power conveyor, balances them and locks them in position while an operator reads unbalance information on a universal level. After he applies the correcting weight the finished piece is returned to the conveyor as the next piece comes into position.**



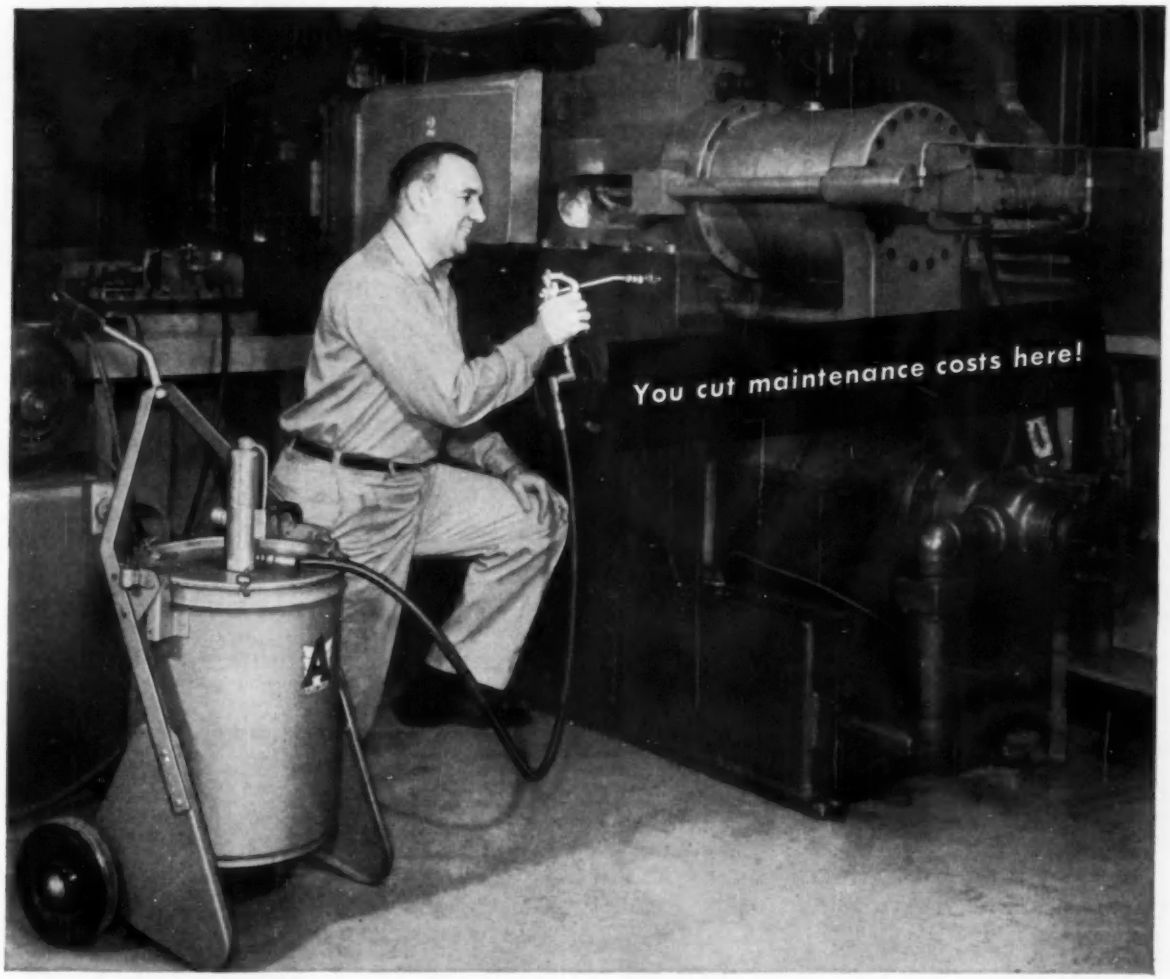
★ *(Right)* **Fully automatic machine takes pieces from power conveyor and delivers them back to conveyor balanced and marked for correction in terms of weight and location.**

★ ***Both models designed for installation in existing automatic mounting and inflating lines.***

MICRO-POISE
ENGINEERING AND SALES COMPANY

14851 Grand River Avenue
Detroit 27, Michigan

Phone: VErmont 8-1134



Alemite Portable Lubricator Saves 95 Man-Hours For Every Drum of Lubricant Applied!

Every point of lubrication in your plant can cost you needless time and money if you use old-fashioned hand lubrication methods!

With this Alemite portable air-powered lubricator, you save *95 man hours* for every 400-lb. drum of lubricant applied. Over *two* weeks of one man's time saved. That's how you can cut maintenance costs with Alemite.

In addition, Alemite's Model "711-A" is so compact and portable that it can bring clean, waste-free lubrication to *any* machine—*anywhere* in your plant—reducing machine downtime and prolonging machine life. Its pivot-swing dolly holds container upright at any pulling angle for easy moving over rough ground, indoors over rough floors, even up and down steps!

Step up to fast-moving, time-saving lubrication methods! Check Alemite's complete line of air-powered and electric-powered lubrication equipment for industry.

Symbol of SW Excellence

ALEMITE
DIVISION
STEWART-WARNER
CORPORATION

1850 Diversey Parkway, Chicago 14, Illinois

—MAIL COUPON FOR COMPLETE INFORMATION!—

Alemite, Dept. U-98
1850 Diversey Parkway, Chicago 14, Illinois

Please send me your free catalog of Alemite industrial lubrication equipment.

Name .....

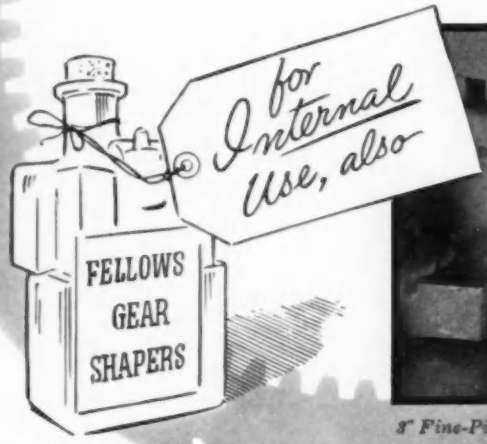
Company .....

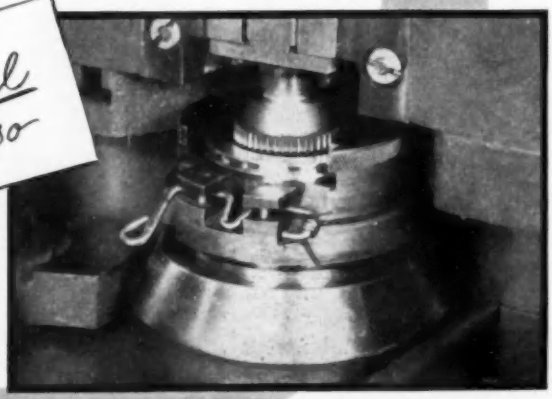
Address .....

City ..... Zone ..... State .....

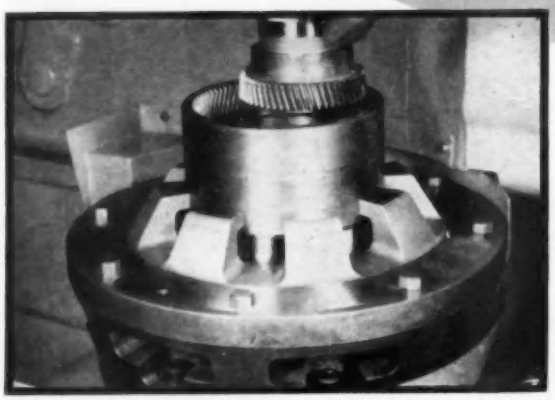
FELLOWS GEAR SHAPERS

cut INTERNAL Gears

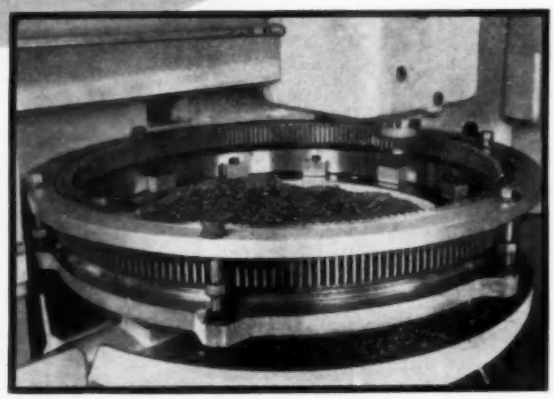




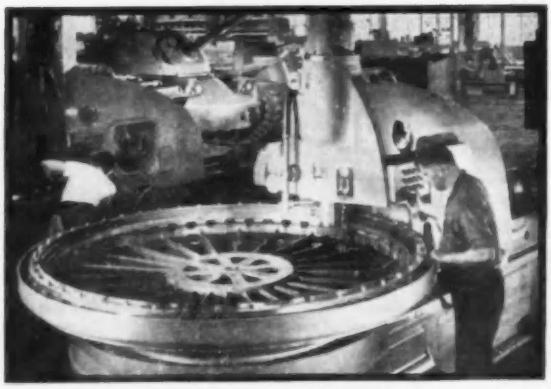
8" Fine-Pitch Gear Shaper cutting internal gear.



No. 10 Rotary Gear Shaper cutting internal helical.



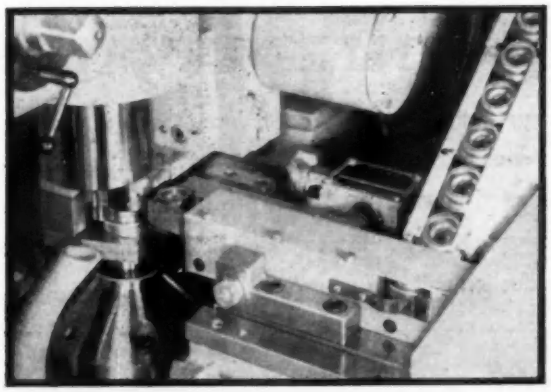
36-Type Gear Shaper with special work-holding fixture.



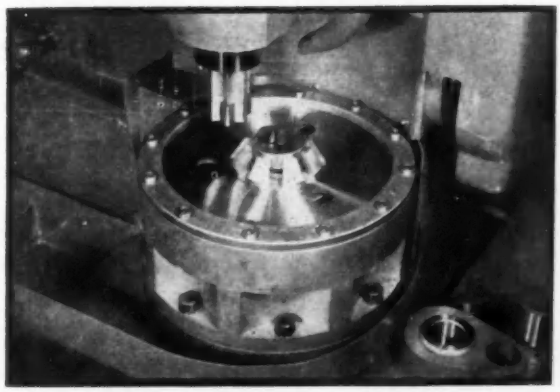
120" Gear Shaper cutting light tank turret gear.

THE
PRECISION
LINE

as EASILY as Externals



4GS Gear Shaper with full-automatic operation.



7A-Type Gear Shaper with fast-action diaphragm chuck.

Not only internal gears, but splines, clutches and an almost unlimited variety of other internal shapes can be produced on versatile Fellows Gear Shapers just as simply, rapidly and economically as external shapes. In many cases, the same Gear Shaper cutter can be used to cut both internal gears and their mating pinions.

Set-ups and change-overs are simple and fast on any Gear Shaper from the 3-Inch Fine-Pitch to the 120-Inch. Rigid construction makes it possible to hold close tolerances at high production rates. On some models, full or semi-automatic operation is available whenever the size and shape of the work and the production requirements make it practical.

Your Fellows Representative can give you full information about the production benefits of Fellows gear shapers, shaving machines, grinding machines, inspection instruments, or cutting tools. Just contact the nearest Fellows office.

THE FELLOWS GEAR SHAPER COMPANY
78 River Street, Springfield, Vermont
Branch Offices: 1048 North Woodward Ave., Royal Oak, Mich.
150 West Pleasant Ave., Maywood, N. J.
5835 West North Avenue, Chicago 39
6214 West Manchester Ave., Los Angeles 45

Fellows *Gear Production Equipment*

RECEIVING ENTHUSIASTIC ACCEPTANCE

VICKERS® New ¼" Temperature and Pressure Compensated FLOW CONTROL VALVE

ANOTHER VICKERS FIRST

FOR OPERATING PRESSURES UP TO 2000 psi

For years the Machine Tool Industry has been asking for a combination Temperature and Pressure Compensated Flow Control Valve to minimize feed rate changes. Now for the first time it is available as a production unit at a reasonable price.

Check THESE EXCLUSIVE FEATURES that mean Optimum Tool Life and Better Work Finish:

☑ **TEMPERATURE COMPENSATED**
Virtually constant feed rates all day long with same throttle setting because throttle automatically compensates for changes in oil temperature. The compensator mechanism is simple in design and durable.

☑ **PRESSURE COMPENSATED**
Constant feed rate throughout entire cycle because built-in pressure hydrostat automatically compensates for load changes.

☑ **SINGLE THROTTLE COMPLETE RANGE ADJUSTMENT**
Greater flexibility because valve is adjustable within entire flow range of 5 to 1000 cubic inches per minute.

☑ **REVERSE FREE FLOW AS STANDARD FEATURE**
A standard feature which permits reverse free flow (up to 1400 cu. in. per min.) from outlet to inlet port by-passing control elements.

☑ **TAMPER-PROOF ADJUSTMENT**
Retention of original feed rate is assured because a set screw prevents inadvertent throttle movement and a cover over the set screw can be locked in place.

☑ **INTERCHANGEABLE**
This new valve replaces 12 previous models and it is interchangeable with all of them, also the drain connection is eliminated on the new valve to simplify piping.

☑ **GREATER ECONOMY**
No need to stock several valves for wide range of flow rates. Drain connection is eliminated, piping costs are reduced.

☑ **MAXIMUM RELIABILITY AND ACCURACY**
Design of temperature and pressure control components assures maximum circuit reliability and extreme accuracy of feed through a range of 5 to 1000 cubic inches per minute.

FOR ADDITIONAL INFORMATION SEND FOR I-195040 8143

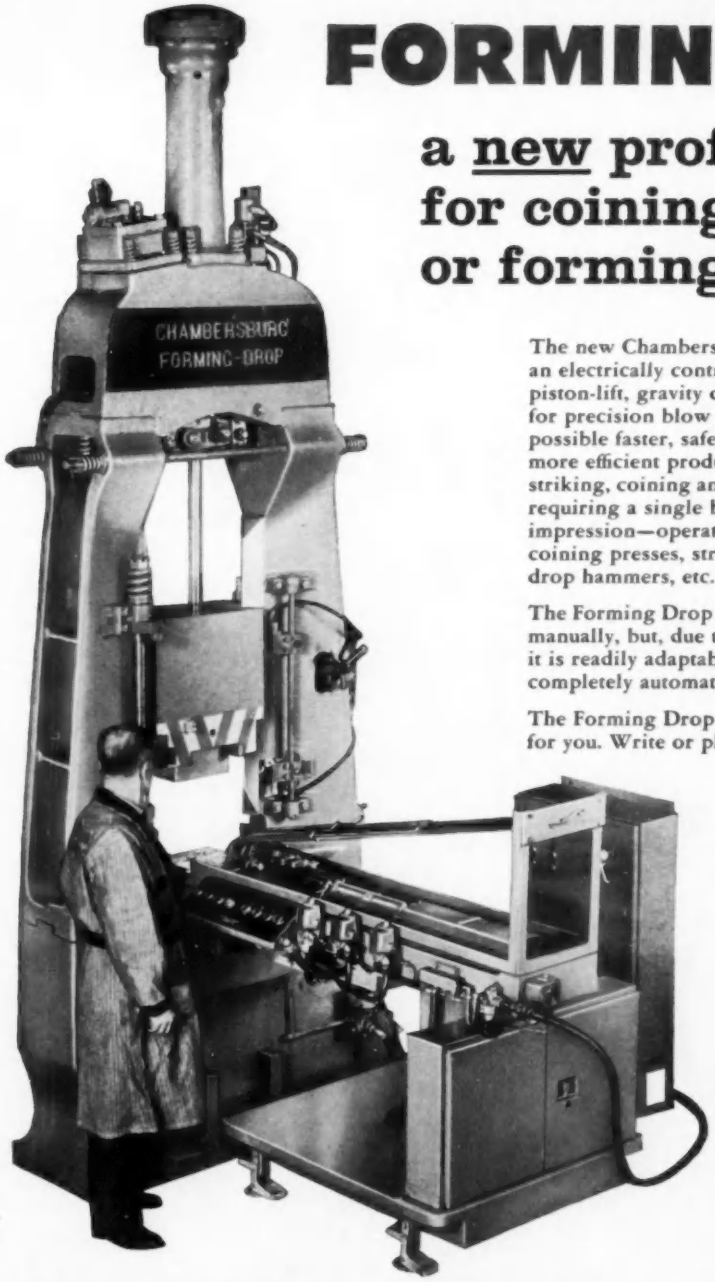
VICKERS INCORPORATED
DIVISION OF SPERRY RAND CORPORATION
Machinery Hydraulics Division
ADMINISTRATIVE and ENGINEERING CENTER
Department 1428 • Detroit 32, Michigan

Application Engineering Offices: ATLANTA • CHICAGO • CINCINNATI CLEVELAND • DETROIT • GRAND RAPIDS • HOUSTON • LOS ANGELES AREA (El Segundo) • MINNEAPOLIS • NEW YORK AREA (Springfield, N.J.) PHILADELPHIA AREA (Media) • PITTSBURGH AREA (Mt. Lebanon) PORTLAND, ORE. • ROCHESTER • ROCKFORD • SAN FRANCISCO AREA (Berkeley) • SEATTLE • ST. LOUIS • TULSA • WORCESTER
FACTORIES ALSO IN AUSTRALIA, ENGLAND AND GERMANY
IN CANADA: Vickers-Sperry of Canada, Ltd., Toronto and Montreal

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

CHAMBERSBURG
FORMING DROP

a new profit maker for coining, embossing or forming operations



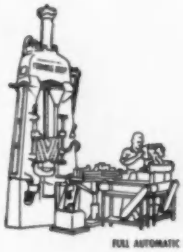
The new Chambersburg Forming Drop is an electrically controlled, air-operated, piston-lift, gravity drop hammer, designed for precision blow control. It makes possible faster, safer, almost effortless, more efficient production on forming, cold striking, coining and embossing operations requiring a single blow in a single die impression—operations common to coining presses, strap hammers, pneumatic drop hammers, etc.

The Forming Drop may be fed and operated manually, but, due to its electrical control, it is readily adaptable to semi-automatic or completely automatic operation.

The Forming Drop may hold possibilities for you. Write or phone for further details.

MANUAL

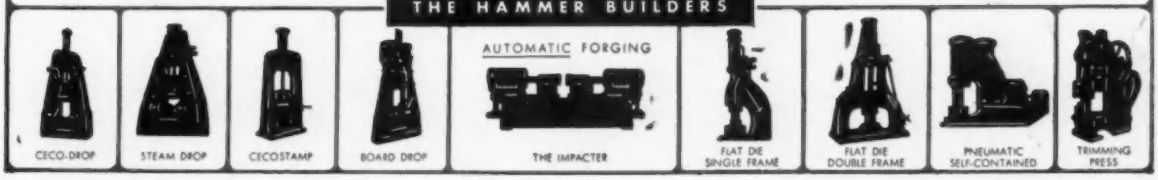
SEMI-AUTOMATIC

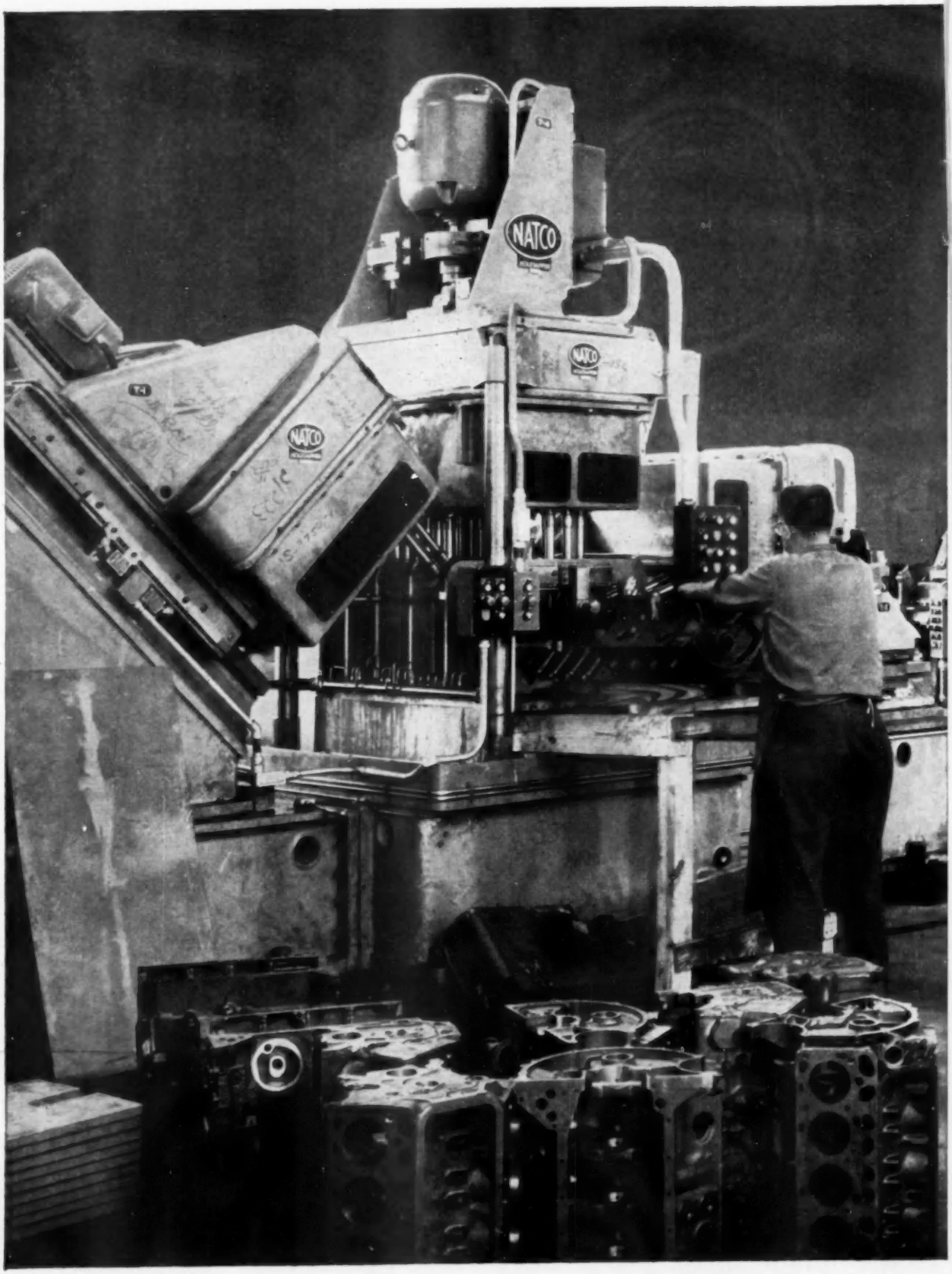

FULL AUTOMATIC

CHAMBERSBURG ENGINEERING COMPANY . . . . . CHAMBERSBURG, PA.

CHAMBERSBURG

THE HAMMER BUILDERS



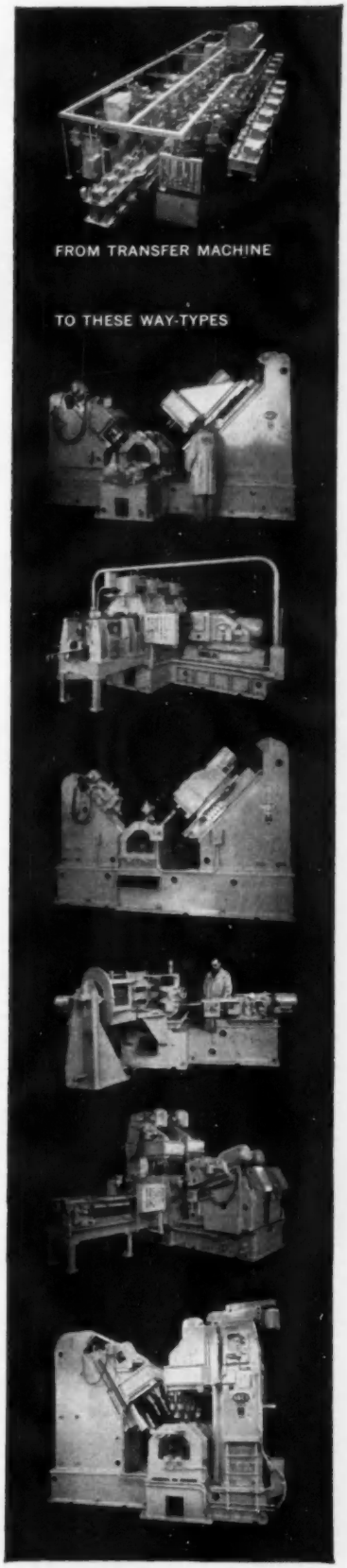

NATCO
NATCO
NATCO

Must your transfer machine go to scrap every time your model changes?

Certainly not. For example, the way-type machines shown here were once stations in an automated straight-line transfer machine. Now they will begin their second life as individual machines on a shorter-run lower-production assignment.

Each station in your Natco transfer machine—whether drilling, boring, milling, sawing or chamfering—is a machine tool in its own right. With modifications and new tooling, it may serve you for many years beyond its original "single-purpose" life.

When product changes call for new tooling, consider adapting the previous machinery to a new use—and realize substantial savings. Natco engineers and manufacturing facilities are at your disposal to make the necessary modifications. Call your nearby Natco representative today to discuss converting your equipment.



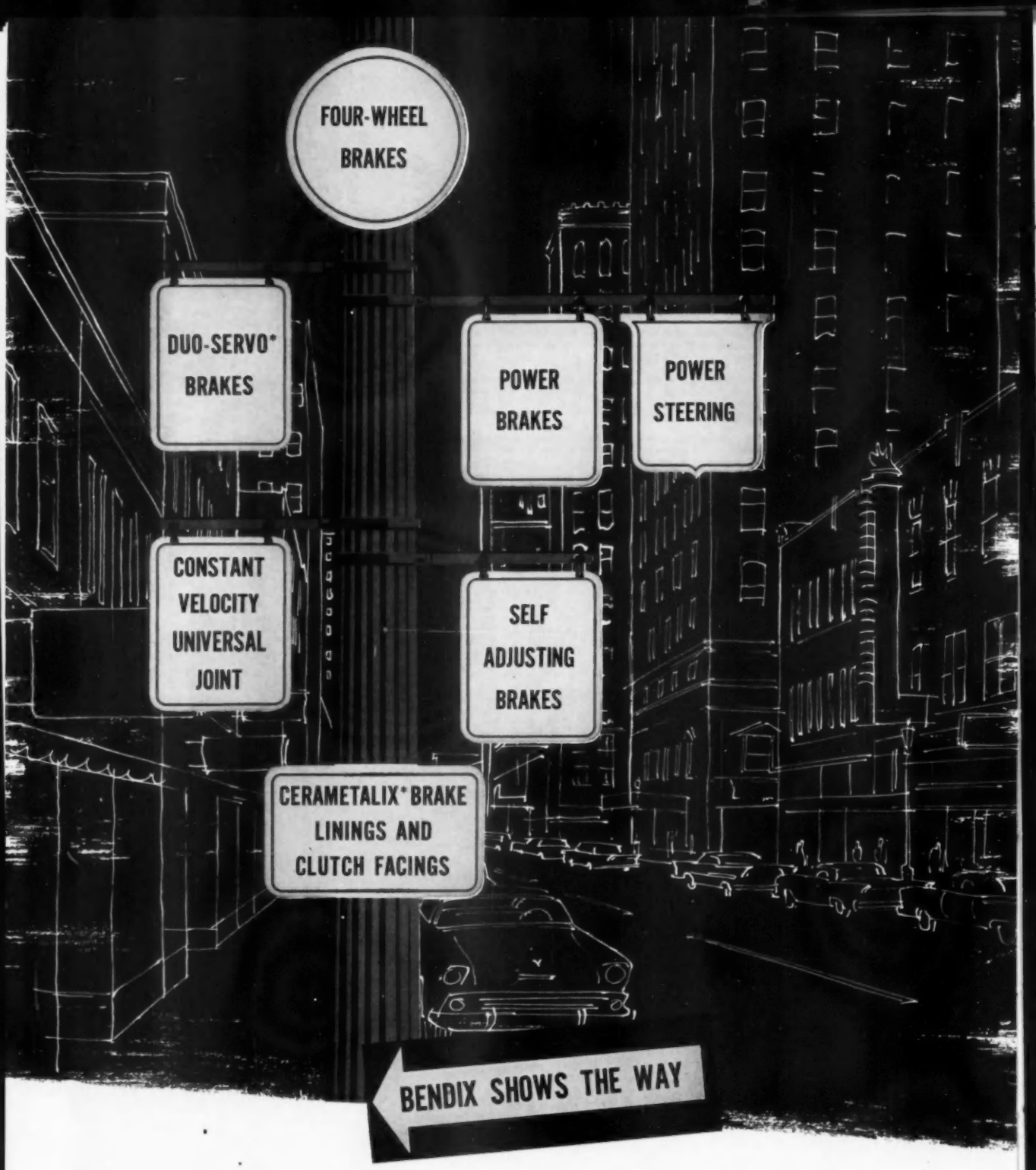
NATCO

Multiple-spindle drilling, boring, facing and tapping machines. Special machines for automatic production.

NATIONAL AUTOMATIC TOOL COMPANY, INC.

Dept. 294-N, Richmond, Indiana

Natco offices in Chicago, Detroit, Buffalo, New York, Boston, Philadelphia, Cleveland and Los Angeles. Distributors in other cities.



Each of these key Bendix developments has had an important influence on the course of automotive design. New Bendix developments now in process demonstrate continuing foresight into the needs of the automotive industry. Let us consult with you now on problems relating to your future.

*REG. U.S. PAT. OFF.

Bendix PRODUCTS DIVISION South Bend, IND.

Bendix AVIATION CORPORATION

AUTOMOTIVE INDUSTRIES

BUSINESS DEPARTMENT

John C. Hildreth, Jr., Publisher
John F. Pfeffer, Asst. to Publisher
E. H. Miller, Advertising Mgr.
James Cadigan, Circulation Mgr.
Norman Lloyd, Marketing Mgr.
John H. Kofron, Research Director

REGIONAL MANAGERS

CHICAGO—William H. Baldwin
—Carl A. Zehner
360 North Michigan Ave.
Chicago 1, Ill.
Phone RAndolph 6-2166

DETROIT—Thomas L. Pickrell
103 Pallister Ave.
Detroit 2, Mich.
Phone TRinity 3-7800

PHILADELPHIA and NEW YORK—
Nelson W. Sieber
Chestnut and 56th Sts.
Philadelphia 39, Pa.
Phone SHerwood 8-2000
and
100 East 42nd St.
New York 17 N. Y.
Phone OXford 7-3400

NEW YORK—Robert P. Hulbert
100 East 42nd St.
New York 17, N. Y.
Phone OXford 7-3400

CLEVELAND—Richard P. Keine
930 B. F. Keith Bldg.
Cleveland 15, Ohio
Phone SUperior 1-2860

DALLAS—William J. Smyth
189 Meadows Bldg.
Dallas 6, Tex.
Phone EMerson 8-4751

SAN FRANCISCO—Frank W. McKenzie
1355 Market St.
San Francisco 3, Calif.
Phone UNderhill 1-9737

LOS ANGELES—L. H. Jackson
198 S. Alvarado St.
Los Angeles 57, Calif.
Phone DUnkirk 7-4337

●

One of the Publications
Owned by

CHILTON COMPANY

Executive Offices
Chestnut & 56th Sts.
Philadelphia 39, Pa., U.S.A.

Officers and Directors

JOSEPH S. HILDRETH, *Chairman of Board*
G. C. BUZBY, *President*
Vice Presidents
P. M. FAHRENDORF L. V. ROWLANDS
ROBERT E. McKENNA GEORGE T. HOOK
Treasurer—WILLIAM H. VALLAR
Secretary—JOHN BLAIR MOFFETT
MAURICE E. COX FRANK P. TIGHE
EVERIT B. TERHUNE, JR.
JOHN C. HILDRETH, JR.
RUSSELL W. CASE, JR.

STANLEY APPLEBY—*Comptroller*

High Spots of This Issue

▼ Machine Tools and Production Equipment

This issue makes available a handy guidebook for planning and selecting equipment for future production. Published annually by AUTOMOTIVE INDUSTRIES, this comprehensive round up covers equipment and products which have applications in plants producing passenger cars, trucks, buses, aircraft, road-building equipment, powered farm equipment, engines, or other components and parts. All items are conveniently arranged in seven sections—Machine Tools, Forming Equipment, Material Handling Equipment, Quality Control, Welding Equipment, and Specialized Equipment. The last category includes die casting, injection molding, controls, components, and others. Page 79.

▼ Modernization of Production Equipment

The selection of machine tools and associated capital equipment is a major management problem in the automotive industries. This article, based on interviews with a representative group of manufacturers, reports on the various ways plant management deals with the problem of machinery replacement. Page 74.

▼ Metals Report

The recent price increase in steel has not curbed buying, for new business has been coming in at an increasing rate. While buying by the automobile industry has been somewhat slower than the general pace, it is expected that this situation will improve once the contract situation with the UAW is settled. Page 132.

▼ Automation News Report

This monthly report highlights important developments in the automatic controls field that have applications in the automotive industries. Featured this month are an acceleration testing system, an automated treadmill used to evaluate experimental motor fuels and lubricants, and a numerically controlled riveting machine. Page 134.

Complete Table of Contents Page 3
Automotive and Aviation News, Page 55

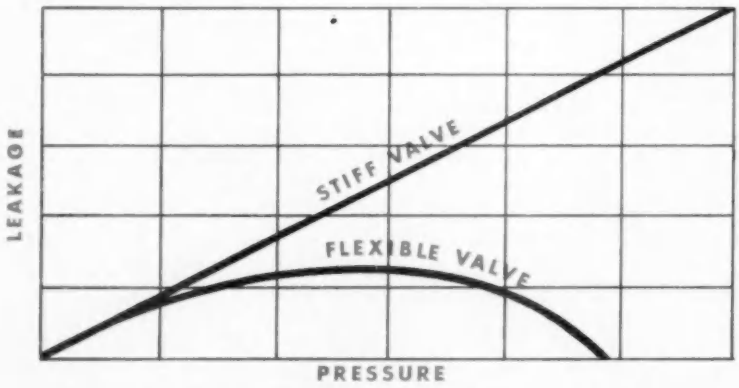
AUTOMOTIVE INDUSTRIES COVERS
PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY • PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
ENGINEERING • PRODUCTION • MANAGEMENT

The New "Long Mileage Look" in Valves

Flexible design and high strength materials can provide improved sealing, better performance, and higher mileage

The higher outputs, greater load factors, and lean mixtures encountered in modern engines are all making greater demands on valves. By utilizing high hot strength materials, valves may be designed that flex from cylinder pressure and tend to conform to a distorted cylinder seat. The result can be greatly improved sealing, maintained engine performance, and higher mileages.

Eaton engineers welcome an opportunity to discuss your valve problems with you.



Leakage Test on Distorted Cylinder Head Seat: With stiff valves, leakage increases in direct proportion to cylinder pressures. With flexible valves, leakage is reduced to zero when cylinder pressure increase produces valve conformity.

Typical seat condition in stiff valve, caused by imperfect sealing. Result: poor performance, low mileage.

Typical flexible valve under comparable operating conditions. Result: Improved sealing assures better performance and longer mileage.

EATON

VALVE DIVISION

MANUFACTURING COMPANY

9771 FRENCH ROAD • DETROIT 13, MICHIGAN

General Offices: CLEVELAND, OHIO

PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

News

OF THE AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 119, No. 5 **September 1, 1958**

S-P Announces New Plans As Curtiss-Wright Pulls Out

Studebaker-Packard Corp., on its own once again, has announced a series of plans for refinancing the corporation and entering fields of operation outside automobile manufacturing.

Since July of 1956, S-P has been guided by an advisory management agreement with Curtiss-Wright Corp. C-W is pulling out of the pact and foregoing an option to purchase 5 million shares of S-P stock at $5 a share.

Harold E. Churchill, S-P president, announced recently that part of the plans call for agreements with 20 banks and 3 insurance companies to convert a portion of his company's $54.7 million indebtedness into $16.5 million in long-term notes and 165,000 shares of convertible preferred stock.

The small car, which he designated as "Model X" until November announcement time, figures heavily in S-P's plans. As reported in AI (May 15, p. 34), S-P plans to concentrate on the short wheelbase model while shelving the Packard name.

The firm definitely plans to continue in the automobile business, Churchill confirmed through production and distribution of the smaller car, taxi-cabs (Mercedes-Benz), commercial trucks, and certain limited-production Hawk models.

But perhaps the most significant confirmation issued by Churchill centered about plans to diversify. Boston industrialist and financier A. M. Sonnabend has been invited to direct a new "Acquisitions Committee" which will recommend to the S-P board of directors other businesses which the firm might acquire.

S-P's Model X will include four models: two-door sedan, four-door sedan, two-door hardtop and station wagon. Both V-8 and six-cylinder engines will be offered. Overall length will be 175 in.

CHINA TURNS OUT FOURTH NEW CAR

A new five-passenger sedan named "Peace" was unveiled recently by the Motor Car Repair Plant in Tientsin, China. The new car is equipped with radio, heater, and air conditioner, and is powered by a four-cylinder, 55-hp engine. It is the fourth model built by the Chinese motor vehicle industry.

Production of 1959 Car Models Under Way at Most Divisions

Production of 1959 models was under way at most passenger car divisions as the industry entered the final quarter of 1958.

Aug. 18 was start-up date at Buick and at all Chrysler divisions except Plymouth, which is slated to begin '59 output Sept. 2. American Motors started back to work Aug. 25. Oldsmobile, Cadillac and Pontiac are slated to resume production immediately after Labor Day, and Chevrolet on Sept. 15.

Ford, however, has not announced when new model production will begin, or even when '58 production will end.

Chrysler began recalling 42,000 employes Aug. 18 when '59 production began at its plants. The corporation said full production at all car and truck plants is expected by mid-September.

General Motors expected to recall 100,000 employes with the start of production, and Ford plans to call back 40,000 workers by the time full production is reached.

Car Makers Offer Fewer Series In Compact 1959 Model Lineups

Automobile manufacturers will simplify their model lineups in 1959, offering fewer series and therefore less confusion among dealers and customers.

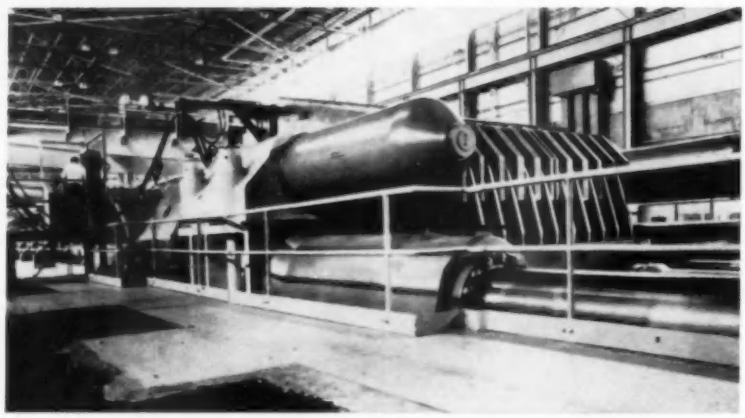
Buick made the first announcement at its press preview in August (see AI Aug. 15, P. 35). Buick will have only three series in 1959—Le Sabre, Invicta and Electra.

Others, still unannounced, will follow the trend toward simplicity in model lineups. And right along with this trend is a complementary move to fill out the top-of-the-line series.

Chevrolet, for instance, will offer only three series in 1959. But the higher-priced Impala, offered on a limited basis in 1958, will be expanded to include 5 models, including a four-door sedan. The Del Ray is being dropped completely.

The elimination of series is espe-

NEWS AUTOMOTIVE AND AVIATION



ALUMINUM PLATE STRETCHER HAS 16 MILLION LB PULL

This aluminum plate stretcher now in operation at the Davenport, Iowa, plant of Aluminum Co. of America is over 160 ft long and weighs more than 5.5 million lb. It can grip rolled aluminum plate up to 6 in. thick and 152 in. wide, and stretch and straighten it at a speed of 22 ipm with a pull of 16 million pounds. The giant machine, said to be the largest of its kind, was designed and built by Loewy-Hydropress Div. of Baldwin-Lima-Hamilton Corp.

cially prevalent in the middle-price cars. One maker is dropping a complete series to concentrate on volume sales in its more popular models. Another, in dropping one low-priced series, has substituted a new series and at the same time expanded its luxury series to four models.

Studebaker-Packard, as predicted in AI (May 15, P. 34), will trim its offerings on a corporation basis, concentrating on a new 108-in. wheelbase car while sacrificing the Packard line.

All of these steps follow a definite trend that has been running contrary to recession-oriented economy moves. Despite the more than 30 per cent drop in car sales in 1958, the higher priced and medium-priced cars have not suffered as much as recession analysts would like to believe.

As one automobile executive put it recently, many of the "low priced three" customers during the past year actually paid for and received medium-priced cars.

'S' Day in Labor Negotiations Due Before End of September

The long-awaited 'S' Day in the current automobile labor negotiations is expected before the end of September, and probably during the final week of the month.

But until the day arrives, it cannot be certain whether the 'S' stands for Strike or Settlement.

As negotiations ended their fifth month without signs of progress, the indications of a strike were about as strong as settlement signs. The union is prepared to strike on one day's notice, but an industry-wide settlement could come just as fast.

The UAW has some $38 million ready for a strike fund. The Union's Ford, Chrysler and GM councils have requested authorization to strike. Although the union's International Executive Board refused the council's first request, it has been pointed out that request could be granted in just one day to pave the way for a strike.

Ford looks like the logical target for a strike. The union's $38 million fund would last 12 or 13 weeks against Ford, if the company is in full production when the strike comes. Against GM, the fund would cover barely six weeks' benefits to striking workers.

Ford has not announced when it will end production of 1958 models, although it is expected to shut down during the final week of September.

There are strong indications that all three companies will shut down if one is struck by the UAW. This has never happened before in the automobile industry, but it has occurred in other fields. The Big Three have been presented with identical demands by the union, with the exception of local or particular demands of a minor nature.

Therefore, if the UAW should strike Ford, GM and Chrysler could assume that they also were being struck indirectly. The legal question of whether this would constitute a strike or a lockout could be a prime issue. If the UAW had to pay strike benefits to all of its members at the Big Three it could not possibly initiate strike action.

Nearly all major automotive suppliers are working under contract extensions, but most of the extensions expire some time before September 27. This is an indication of when 'S' Day will occur.

Meanwhile, the UAW is proceeding with negotiations with American Motors and Studebaker-Packard Corp., and with the farm implement and automotive suppliers fields.

The "big four" of the farm implement field—Caterpillar, International Harvester, Allis-Chalmers and John Deere—all are working under contract extensions. Only the aircraft industry signed new contracts before the old ones expired.

Curtice Sees 5.5 Million Cars For 1959, 8 Million by 1965

General Motors president Harlow H. Curtice predicted an upward swing in the nation's economy in general and in the automobile industry in particular that will bring production and sales of 5.5 million cars in 1959 and 8 million units by 1965.

Curtice made his observations at GM's 50th anniversary luncheon Aug. 15 in Flint, Mich.

He based his long-range optimism on such factors as anticipated population growth (190 million by 1965), increased gross national product and disposable personal income ($600 billion and $420 billion by 1965), new jobs (employment up to 73 million), greater number of two-car homes (more than 11 million, compared with current 7.5 million) and other economic indicators.

He based his 1959 prediction on the shift in the direction of the economic trend in the past few months, and on the anticipated impact of '59 car models.

He pointed out that manufacturing employment in June and July rose slightly for the first time in 18 months, and that industrial production has recovered from the low point reached last April. Retail sales also remain above the winter low point, and GNP, after declining for two successive quarters, rose slightly in the second quarter to $428 billion.

More specifically, he said his own company expects to rehire some 100,000 workers by mid-October, and GM hourly-rated employment will be up to 325,000 by Nov. 1.

Speaking of the model change, Cur-

tice took the opportunity to answer recent criticisms of the automobile industry's practice of redesigning and retooling every 12 months.

"It is my considered opinion," he said, "that the annual model change has been the most important single factor responsible for the growth and vitality of our industry." The annual change, he continued, stimulates competition, technological progress, efficiency and general industry growth, while providing a higher sales volume and a used car market.

The luncheon was the highlight of GM's Golden Milestone year. Similar civic celebrations were held earlier at other plant cities around the country.

Ford Will Add New Line Of Industrial Tractors

Ford Motor Company's Tractor and Implement Div. will introduce a new line of industrial tractors and high-capacity digging and loading equipment.

The new line was shown to distributors and key dealers in August, but details will not be made public until late October when all dealers are stocked.

The tractors already are in production at Ford's tractor plant in Highland Park, Mich., and the matching equipment will be built at the implement plant at Des Moines, Iowa.

Merritt D. Hill, general manager of the division, said the new tractor-loader combination has more than twice the lifting capacity of previous models used on industrial jobs.

Ford is extending industrial franchises to dealers, either existing or new, to handle the line. This agreement would be separate from the farm tractor sales agreements.

General Electric Develops New Nitrile Silicone Rubber

General Electric Co. scientists have discovered a new kind of rubber that resists oil and maintains its strength and usefulness at temperatures ranging from minus 100 F to over 500 F.

The new material—nitrile silicone rubber—was described by Dr. Guy Suits, General Electric vice-president and director of research, as "a major advance in chemistry that offers industry a unique combination of properties never before available in a single material."

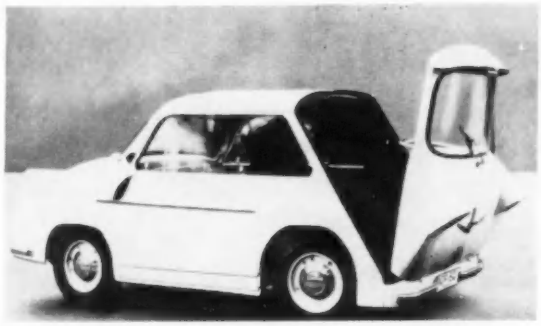
Dr. Charles E. Reed, general manager of the company's Silicone Products Dept., said the Air Force has long sought such a material for O-rings, seals and gaskets in aircraft engines and hydraulic systems, as well as for hoses and couplings that must resist both high and low temperatures as well as fluids they carry or are in contact with.

One of the most important automotive applications, he pointed out, will be in automatic transmission seals, where nitrile silicone rubber will eliminate the need to compromise between marginal oil resistance with some materials and marginal heat resistance with others. Differential seals, crankshaft seals, rubber brake parts, and gaskets are other promising automotive applications, Dr. Reed said.

The company stated that the new rubber would be available commercially by the end of the year at an estimated price of $15 a pound.

POLISH CAR

Front door hinged at the bottom is unusual feature of this Polish prototype car — the SMIJK — which seats two adults and two children. Car is powered by a 21.5 cu in. rear-mounted engine and weighs only 770 lb.



Chrysler Sets Up Sales, Service Organization in U. S. for Simca

Chrysler Corp. has set up a sales and service organization to handle the French-made Simca passenger car in the United States. Chrysler is sole distributor in this country for the Simca line under terms of a recent agreement between Chrysler and Simca (see AI Aug. 15, P 33).

Simca sales will be handled by Chrysler's general sales office under vice-president E. C. Quinn. David R. Crandall has been appointed director of Simca sales in the U. S. Advertising plans are being developed under Richard E. Forbes, director-corporate advertising.

Parts and accessories are being made available through MoPar Div., and Philip B. Hopkins, director of the central service staff, is coordinating service training and service facility development.

As part-owner of Simca, Chrysler also will handle the Simca cars on the export market, supplementing Simca's present world-wide distribution network.

Public Will Get First Look At GM Cars at Motorama

The public will get its first look at all five General Motors lines at GM's Motorama Oct. 16-22 in New York. Dealer announcements will follow the New York showing, which will be held at the Waldorf-Astoria.

Theme of the extravaganza will be "Imagination in Motion." In addition to the five GM lines, the corporation will unveil a futuristic "dream car."

New Army Vehicle Will Use Kaiser Alloy 5083 in Hull

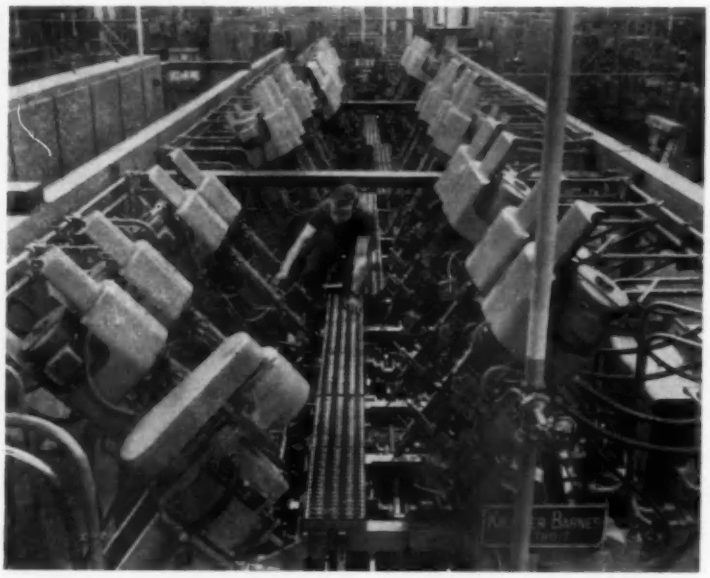
Aluminum alloy 5083, a high-strength weldable metal developed by Kaiser Aluminum, will be used to manufacture the hulls for three pre-production models of the Army's new T113-E2 lightweight armored military vehicles.

The new vehicles are being built by the Ordnance Div. of Food Machinery and Chemical Corp. under a $1.5 million contract. In addition to the hull, the vehicle's power plant and a number of other components will be made of aluminum.

MINICAR

Finnish prototype minicar, called WIIMA is only 63 in. long and weighs 620 lb. Built by Oy Uusi Autokoriteollisuus AB, of Helsinki, Finland, the new car is powered by an 18.5 cu in. engine mounted in the rear.

NEWS AUTOMOTIVE AND AVIATION



This 52-ft-long, transfer-type, special purpose machine tool at Ford's Lima plant automatically drills the entire oil system in an automobile crankshaft in one continuous operation

Ford's New Engine Plant Has Daily Capacity of 4000 Units

Ford Motor Co.'s new Lima, O., engine plant with over 1 million sq ft of floor space for the production of Mercury, Edsel, Lincoln, and Continental engines has a daily capacity of 4000 units on a two shift basis.

The plant is a key project in the vast expansion and modernization program for which Ford has spent more than $4 million since the end of World War II.

Gun drilling and gun boring operations along the cylinder head line are exceptional. The gun drilling machines feature a high degree of accuracy and are said to be approximately three times as fast as conventional drilling equipment.

Automatic multiple station checking gages have been integrated into production lines where they keep a constant check on machined parts. In addition to the in-line inspection mechanisms, there are approximately 1700 different gaging applications in use to insure production of quality engines.

An outstanding development is the automated crankshaft area where 80-lb automobile crankshafts move through a series of machine tools which make up a 588-ft long machining line. The new plant features three identical crankshaft lines. Parts are automatically loaded and unloaded at the various stations and are lifted, revolved and positioned.

Multiple-station quality control gages are built into many of the machines in the crankshaft line and the part is thoroughly inspected before it passes to the following operation.

If the crankshaft does not meet specifications, the gage automatically rejects it and production halts. The trouble area is indicated on the control console and tooling corrections must be made before machining operations can be resumed.

The crankshafts also are electronically balanced by machines which test their own work and, if not satisfactory, automatically repeat the operation. An out-of-balance crankshaft cannot escape from the electronic unit.

In-line machining operations along the cylinder block line feature simplicity and compactness of equipment permitting more production equipment to be used within the same area and reducing handling and floor space requirements. A number of operations can be combined in a single in-line transfer-type machine where formerly a series of single machines, tied together by various transfer devices, were used.

Kaiser Predicts Greater Use Of Aluminum in 1959 Cars

Aluminum will continue to move in on the U. S. automobile industry during 1959, according to Kaiser Aluminum, with industry consumption up by nearly 50 per cent during the coming model year.

Two factors will contribute to the increased consumption, which Kaiser predicts will total 337 million lb during the year. One is a 14 per cent increase in the average amount of aluminum in the 1959 models, the other is an increase in passenger car sales to an estimated 5.9 million units.

V. E. Flaherty, automotive industry manager for Kaiser Aluminum & Chemical Sales, Inc., says the average 1959 automobile will contain 57.1 lb of aluminum, compared with a current average of 50 lb and 1957 figure of 46.3 lb.

The automobile industry's consumption, including manufacturing scrappage, will total approximately 228 million lb by the end of the 1958 model run, according to Flaherty.

The Kaiser spokesman said that more liberal use of aluminum for molding and trim areas and increased installation of certain optional equipment using aluminum account for the percentage gains for 1959.

Cast components are expected to show a 15 per cent gain in 1959, compared with an 8 per cent increase during 1958. Wrought products, on the other hand, will show a 10 per cent advance, according to Flaherty, compared with a 53 per cent increase during 1958 production runs.

Looking into the future, Flaherty foresees a need for an additional 200 million lb of aluminum for castings by 1962. Cast engine blocks and wheels, as well as other cast components, will up the average per-car consumption to 72 lb of aluminum, or more than double the 1958 casting total.

Chevrolet is expected to show the greatest percentage increase in 1959, boosting its aluminum content by 21 per cent to an average of 42.3 lb per car. All GM makes will show a 14 per cent increase to 54.1 per cent.

Chrysler products, already heavy aluminum users, will increase their average content by 6 per cent to 73 lb per car. Imperial, although dropping its total to 131.5 lb per car, will be the top customer for the aluminum mills.

Ford Motor Co. products will increase their consumption to 53.8 lb per car, with Ford cars showing a 20 per cent increase.

A slight drop is expected at American Motors, according to Kaiser tabulations.

Swivel Seats Will Be Offered By Chrysler on 1959 Models

Swivel seats for the driver and front passenger will be offered by Chrysler on models in all five car lines for 1959.

The seats, which pivot 40 degrees outward, will be standard equipment in Plymouth Sports Fury models, the De Soto Adventurer and the Chrysler 300E. They will be optional equipment on the Dodge Custom Royals, De Soto Firedomes and Fireflites and all models of Chrysler and Imperial.

The 1959 Chrysler lines will be introduced in mid-October.

The swivel seats are designed to facilitate getting in and out of the car. The center portion, above the drive shaft tunnel, remains stationary as a third passenger seat. The back of the center seat folds down as an arm rest.

The two swivel seats are controlled by levers and a spring action which turns the seat outward. The seat rolls on nylon bearings. A semi-contoured shape, with the outside edges of the seat and back firmer than the middle section, gives a bucket seat effect.

Swivel seats introduced by Chrysler on 1959 models are controlled by convenient levers and a spring action that causes them to swivel outward.

Roche Says Cadillac Increased Market Penetration in 1958

Cadillac's general manager, James M. Roche, said his division increased its share of both the total passenger car market and the luxury car market during the first half of 1958, despite a drop in sales.

Speaking at the press preview of the 1959 Cadillac, Roche said Cadillac increased its share of the domestic market from 2.4 per cent to 3.1 per cent during the first half of the year. Its precentage of the high-priced field rose from 48.9 per cent a year ago to 59.6 per cent this year.

Roche said the new Cadillac incorporates the most extensive changes in the automobile's 57-year history. Details will be announced Oct. 1; production will begin Sept. 2.

Production of 1958 models totaled 121,786 cars. For the corresponding period in the 1957 model year, the division produced 125,030 cars. This year, of course, was a short year since the changeover came earlier than a year ago.

Roche said sales for the 1958 model year through Aug. 20 were estimated at 111,200 cars compared with 118,500 in the same '57 period. This is a drop of about six per cent.

The Cadillac boss became the third GM executive to predict sales and production of 5.5 million cars for 1959. Earlier Buick's Edward T. Ragsdale and GM president Harlow H. Curtice had made similar predictions, although Ragsdale had given a range of 5.25 million to 5.5 million.

Cadillac's 3.1 per cent market share would give the division sales of 170,000 during 1959, if the industry sells a total of 5.5 million. This would be an all-time record for Cadillac. Roche did not say what he believed Cadillac's sales would total, however.

Cadillac is not changing its model and series designations in 1959. Generally speaking, the cars will have about the same dimensions as their '58 counterparts, although they will be several inches lower. Several engineering changes are being incorporated in the new line.

GM Engineer Sees Firm Future For Diesel and Gas Turbine

The Diesel engine will continue to be the leading power plant in commercial vehicles, although the gas turbine has arrived in a competitive form and shows great promise for the future, according to Dr. Peter Kyropoulos, of technical development at GM's Styling Staff.

Dr. Kyropoulos, speaking at Los Angeles' SAE meeting, said the Diesel has not yet exhausted its potential for development, and it will be replaced by a new engine only if the new unit is smaller, lighter, more economical to produce and to maintain. And this would have to come in the face of continued improvement of present engines.

The GM spokesman said the gas turbine has great promise in the size range beyond the Diesel engine, and it already is coming up fast as a second choice in the larger ranges.

Dr. Kryopoulos said that research on unconventional power forms for vehicles is continuing in the automobile industry, but he sees no immediate prospect of cars driven by solar, nuclear or steam powerplants.

The steam engine offers some attractive characteristics he said but the disadvantages are overwhelming.

Detroit Plastics Engineers Plan Automotive Conference

Use of plastics in the automobile industry will be the central theme at the fourth annual regional technical conference of the Detroit Section of the Society of Plastics Engineers, Sept. 12-13.

Among the topics to be covered are vacuum metalizing in the automotive industry, polyester premix, thermoplastic materials for interiors, compression molding, plastics for manufacturing equipment and tooling aids, and advances in car lamp design.

Co-chairmen of the conference are Richard C. Oglesby of Rohm & Haas and Dr. John D. Young of Du Pont. Participating in the sessions will be representatives of Ford, Chrysler, General Motors, American Motors, U. S. Rubber, Woodall Industries, and Electric Auto-Lite.

Goodyear Marketing New Tire With Steel Cord Breakers

Goodyear Tire & Rubber Company is marketing a pneumatic tire with steel cord breakers for industrial use where punctures are frequent. The tire has a barrier of two criss-crossed steel cord breaker strips locked in place beneath the tread. The tire, two years in development, is being offered in sizes up to 7.50-15, 10-ply.

NEWS AUTOMOTIVE AND AVIATION

REEFER ROLLS

First production model of the new Brown refrigerated trailer is on the road for Burlington Truck Lines, Inc. The 35-ft meatrail trailer has a shell insulated with a combination of glass fiber, Styrofoam block, and polyurethane materials. Ceiling, sides, and door of interior are lined with U.S. Rubber Royalite plastic.

Plymouth Will Get Bigger Push From Corporation During 1959

Plymouth Div. will get more attention from the Chrysler Corp. during 1959 in an effort to strengthen the sales and profit position of the company's backbone division.

Chrysler started a campaign two years ago to boost Plymouth, when corporation dealers and salesmen were told the "Plymouth is our No. 1 product." Corporation management realized the necessity of developing Plymouth as a money-maker.

Plans for 1959 are a continuation of the policy initiated earlier, but with even more emphasis than before.

Product will be the keystone in Chrysler's plans for the Plymouth car. The Plymouth for 1959 will have greater styling changes than any of the other corporation cars. The new Plymouth, in fact, has been called a "small Imperial" by some.

Rear end changes, particularly, highlight the efforts to make Plymouth a strong sales contender.

A realignment of series and models will make the Plymouth line a strong unit. The Fury is being expanded at the top of the line, and at the lower end of the price scale one new series is being substituted for a discontinued series.

Chrysler has been strengthening the Plymouth dealer organization during the past two years, and with noticeable results. In 1956, Plymouth accounted for 52.4 per cent of the corporation's domestic retail sales. During the first half of 1958, Plymouth chalked up an even 60 per cent of corporation sales.

The number of single line Plymouth dealers has been nearly tripled during the past two years, from some 70 to a current 200. Of Chrysler's 8000 retail dealers, 7000 handle Plymouth. This means that some 6800 still handle Plymouth plus some other corporation line.

Chrysler calls it a "slow, careful" process that involves area study, market analysis and consultation with other dealers. But the volume of business done by single line Plymouth dealers, compared with dual line dealers, has shown that the move has been in the right direction.

Plymouth, incidentally, recently celebrated its 30th birthday. The division was set up by Chrysler Corp. in 1928 after two years of planning and engineering. Since then Plymouth has built more than 10 million cars.

Shipments jumped from 58,031 Plymouths the first year to 102,347 in 1929 and 636,841 in 1957.

All Chrysler Cars Will Have New Enamel Finishes in 1959

All five Chrysler Corp. cars for 1959 will be finished with a new high-metallic enamel which Chrysler engineers say can go for three years without a waxing.

The new enamel, two years in the testing stage, permits Chrysler to offer a wider range of high-metallic colors.

According to Alan G. Loofbourrow, director of engineering, aluminum particles can be used for up to 100 per cent of total pigment. Previously, he said, the automobile industry was limited to a maximum of about 60 per cent aluminum in total pigment.

Chrysler invested approximately $1 million for improved application systems in its assembly plants to handle the new paints. The company admits that the enamel's high melamine content and new alkyd resin formula make the paint more expensive to manufacture.

Loofbourrow said the 1959 enamel will have between 20 and 30 per cent melamine resin compared with approximately 10 per cent in older enamels. The formula for the remaining alkyd resin has been changed and is now based on non-oxidizing cocoanut alkyds instead of soya or linseed oil base.

Florida sun tests showed the new finish withstood 24 months of "average" service before anything more than a wash was required, Loofbourrow added.

Imperial Production Begins At Former De Soto Plant

Production began Aug. 11 at the Imperial car's new home, the former De Soto Warren plant in Dearborn, Mich.

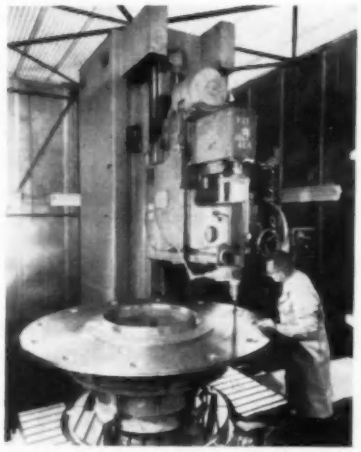
Imperial and De Soto are changing places, so to speak, as '59 production gets under way. The De Soto cars (except for the series made by Dodge Div.) will be built in the Chrysler Jefferson plant, where Imperial has been built in the past.

One reason for the switch was to get the Imperial in a plant by itself and away from the Chrysler assembly line, so that more care could be taken in quality control. In its new plant, Imperial will get 100 per cent attention, while in the Chrysler plant it was shunted to the background by volume production of Chrysler cars.

Part of the "multi-million dollar" revamping and tooling of the plant includes installation of a new floor and conveyor system, plus other new production equipment. Imperial now has better than 1 million sq ft of space on a single floor.

Rated capacity of the plant is 27 units an hour.

As part of the emphasis on quality control, Imperial plant engineers have devised a "zone system" of inspection



P&W JIG BORER

New Pratt & Whitney 4EA jig borer is said to have a larger work size capacity than any other jig borer in the world. Here 12 holes are being bored in an index turntable for a special rotary transfer machine for Hartford Special Machinery Co. The table is 74 in. in diameter and 38 in. high.

and correction. In this plan the car is given a check as it progresses, and any corrections must be made before the unit can pass on to the next zone. This is in addition to regular final inspections and other routine steps. In all, there are 32 quality control stations in the production area of the plant.

Each car is given a water test in a special booth built on the final assembly line. Another 100 per cent test item is the road test given each car.

Ford Wants To Build Factory In Argentina for Trucks

Ford Motor Co. has made a proposal to build a plant in Argentina for the production of trucks and tractors. Action will be taken by the Tractor Council of Argentina. The proposal is to make the Ford F-700 trucks and the Fordson Major Tractors.

Boston Museum to Open Power Steering Exhibit

The Boston Museum of Science will open officially a permanent exhibit of power steering equipment on Sept. 15. The exhibit will feature five prototype models of power steering by Francis W. Davis, inventor of automotive power steering, together with cutaway models of modern power and manual steering gears built by Saginaw Steering Gear Div. of General Motors Corp. Included also will be a "live" exhibit of two steering wheels showing the difference between manual and power steering.

AI TABLOID

Dayton Rubber Co. announced a new curing operation that greatly extends the life of large truck tires. Immediately upon removal from the curing press, the tires are inflated to 100-lb pressure and then allowed to cool. The new technique, developed in cooperation with Du Pont, brings out all the advantages of nylon cord construction, Dayton says.

* * *

Temco Aircraft Corp. developed two new processing techniques that are expected to provide better stainless steel honeycomb panels. One development, called Temcombing, is a continuous process of fabricating stainless steel sandwich that will produce panels up to 4 ft wide and 10 ft or more in length; the other is a simplified two-stage process for brazing such honeycomb structures.

* * *

Titanium Metals Corp. of America and Deutsche Edelstahlwerke (DEW), a leading German specialty steel producer, formed a jointly owned company to produce and market titanium metal in Europe.

* * *

Industrias Kaiser Argentina, an affiliate of Willys Motors, Inc., is building a $2 million integrated forge facility at its automotive manufacturing plant ir Cordoba, Argentina, with completion scheduled for early 1959.

* * *

Neutro-Gear, Inc., has developed a new door-operated safety device for motor vehicles with automatic transmissions designed to prevent a car from remaining in gear when the driver leaves the engine running and steps out. The device, called Neutro-Matic, automatically disengages the gear and shifts to neutral position when the driver opens the door to leave his car.

* * *

A series of radiation-resistant fuels for possible use as lubricants, reactor coolants, or hydraulic fluids over a wide temperature range has been developed for the Air Force by Monsanto Chemical Co. and Shell Development Co. The fluids—polyphenyl ethers composed of benzene and oxygen — remain liquid from 20 to 800 F and retain lubrication characteristics throughout these temperature ranges.

Lilly Research Laboratories report the development of a bacterial inhibitor that will extend the life of soluble oil emulsions used by the metal working industry. Called Elcide 75™, the inhibitor prevents formation of slimes and sludges, which result in acid formation, rusting, and corrosion.

* * *

Pittsburgh Corning Corp. developed a new acid-resistant insulating and refractory material called Foamsil that it says can neither oxidize nor absorb moisture and is resistant to all acids except hydrofluoric and hot phosphoric. The new material is composed of 99 per cent fused silica and has a temperature range of from minus 450 F to 2200 F.

* * *

Titanium Metals Corp. of America is now marketing a new titanium sheet with tensile strengths of about 190,000 psi. To achieve these strengths, TMCA developed a new furnace in which the metal is heated to 1600 F through a quick, powerful jolt of electricity and is then suddenly quenched in water.

* * *

Taylor Fibre Co. has developed a new composite laminated plastics for use in nose cones and other missiles components that is said to conduct about 25 per cent less heat from the surface than the most effective homogenous materials tested. The high-temperature laminate is made by alternating two materials developed by Taylor: an asbestos mat and a nylon fabric material, both impregnated with a special phenolic resin.

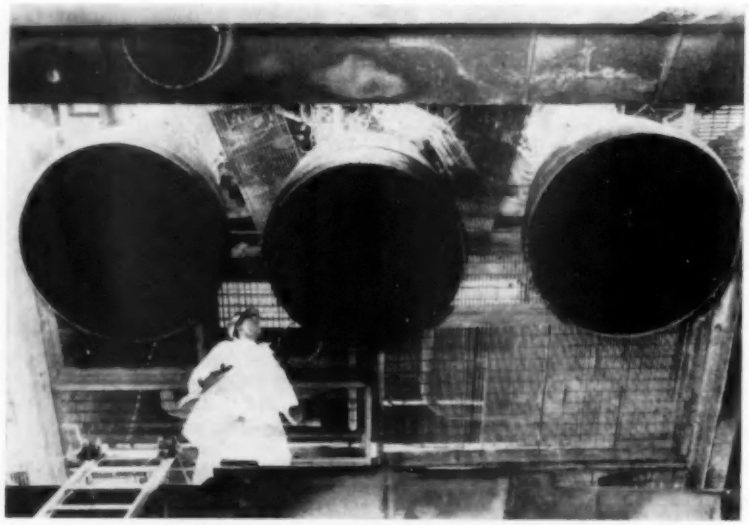
* * *

Du Pont Co. has been licensed to manufacture and sell a new grade of ultra-high-purity silicon under a process developed by Standard Telecommunication Laboratories, Ltd., of London, England, an affiliate of International Telephone and Telegraph Corp.

* * *

The Tapco Group of Thompson Products, Inc., has created a new sales and marketing organization to serve the missile, aircraft, electronics and nuclear fields on a regional basis.

AVIATION MANUFACTURING



ATLAS ENGINE NOZZLES SHOWN FOR FIRST TIME

This is the first closeup view of the new fully powered Atlas rocket engines taken after the recent successful long range flight test of the missile at Cape Canaveral, Fla. The primary units consist of a twin chambered 165,000 thrust booster at the sides and a 60,000 lb thrust sustainer in the center. Propulsion system also includes two small vernier or stabilizing engines mounted on the missile frame to prevent roll.

Republic Completes First Model Of Experimental Space Engine

Republic Aviation Corp. announced it has completed preliminary work in a program to design and build "a magnetic pinch plasma engine" for outer space flight.

Alfred Kunen, Republic scientist, told the American Astronautical Society meeting at Stanford University, Palo Alto, Calif. that the first experimental model of the new engine has been completed and is now undergoing laboratory tests.

The new engine under development will use a heavy gas such as liquid oxygen for fuel and turn it into a plasma—a state of matter evolving from gases in which molecules are broken into electrons and positive ions. This provides tremendous power for a comparatively small amount of fuel, Mr. Kunen noted.

Republic's process, for which patents are pending, involves a method of compressing and accelerating a fuel in a cylindrical magnetic field and shooting plasma out the rear during outer space flights at tremendous velocities.

Mr. Kunen explained that the engine wouldn't have enough power to lift a space ship into an orbit, and that this job would have to be done with either chemical or nuclear rockets. Once in orbit, the plasma engine would take over and propel the space ship into an interplanetary flight path. The engine would continue to operate intermittently, he said, propelling the ship on a proper path, allowing it to coast for thousands of miles, then providing another power spurt.

Working on the engine with Kunen at the present time are William McIlroy, Joseph Neuringer, and Milton Minneman of Republic's scientific research staff.

Boeing Space Study

An unmanned reconnaissance vehicle that could be launched from an earth satellite to travel to Mars and back was described to the Astronautical Society by two Boeing Airplane Co. engineers.

The vehicle would be assembled at the satellite in orbit around the earth and its mission—from launching to recovery—would take about three years.

Henry K. Hebeler and Richard D. White, authors of the advanced study, said the vehicle would be shaped like a disc, measure about 40 ft across, and weigh about 600 lb, instruments and all.

The vehicle, launched from at least 400 miles above the earth, would be powered by an ion accelerator and be kept on its flight path by a "memory" electrically pre-programmed into the vehicle. Fine corrections would be made by an optical star-tracking system.

Hebeler and White said that all moving parts would be driven by electrical power supplied by solar batteries. The vehicle would be built of beryllium, steel tension wires, honeycomb core sandwich for its large reflectors, and quartz for the navigation-system lenses.

Although Hebeler and White have designed a 1/20th-scale model of the space vehicle, they said that the design is not being considered for construction by Boeing at the present time.

Douglas Announces Plans For Wind Tunnel Center

Douglas Aircraft Co. announced plans for $10 million wind tunnel center capable of testing vehicles designed to travel more than 8000 mph.

The center, located at El Segundo, Calif., will consist of three separate tunnels—trisonic, supersonic, and hypersonic—and will be administered by the El Segundo Div.

Frederic W. Conant, board vice-chairman, said that construction of the 4-ft-sq supersonic tunnel is now underway, with completion scheduled for January, 1959. Construction of the 24-in. diameter hypersonic tunnel, which is capable of speeds of from Mach 5.0 to more than 10.0, is scheduled to begin late this year, with completion slated for the second half of 1959.

Three large compressors—two 5000 and one 3500-hp models—will supply air for the supersonic test section. The compressors will be capable of reducing 34,000 cu ft of air per minute to a pressure of 525 psi.

AUTOMOTIVE INDUSTRIES KEEPS YOU INFORMED

• • INDUSTRY STATISTICS • •

WEEKLY U.S. MOTOR VEHICLE PRODUCTION

As reported by the Automobile Manufacturers Association

Make	Weeks Ending August 9	Weeks Ending August 2	Year to Date 1958	Year to Date 1957
PASSENGER CAR PRODUCTION				
Rambler	.....	3,004	110,834	62,758
Total—American Motors	.....	3,004	110,834	62,758
Chrysler	.....	48	35,547	84,608
De Soto	.....	15	23,101	81,682
Dodge	221	254	66,785	202,689
Imperial	.....	2	8,330	28,587
Plymouth	7,676	7,235	246,192	459,635
Total—Chrysler Corp.	7,897	7,554	379,955	857,201
Edsel	322	326	7,925	8,327
Ford	22,743	15,508	603,842	988,226
Lincoln	280	309	16,339	26,348
Mercury	4,087	.....	76,248	199,646
Total—Ford Motor Co.	27,412	16,143	704,354	1,222,547
Buick	.....	.....	133,111	271,858
Cadillac	.....	2,822	89,510	103,176
Chevrolet	30,300	29,590	860,324	972,687
Oldsmobile	.....	2,388	203,146	264,431
Pontiac	.....	1,322	136,675	233,478
Total—General Motors Corp.	30,300	36,122	1,422,766	1,845,640
Packard	.....	.....	1,723	4,616
Studebaker	.....	24	21,601	38,951
Total—Studebaker-Packard Corp.	.....	24	23,324	43,567
Checker Cab	.....	.....	2,120	2,596
Total—Passenger Cars	65,609	62,847	2,643,353	4,034,310
TRUCK AND BUS PRODUCTION				
Chevrolet	5,753	5,299	178,766	225,505
G. M. C.	1,084	1,064	37,861	42,472
Diamond T	83	.....	3,211	3,262
Divco	60	.....	1,668	1,963
Dodge and Fargo	1,520	1,359	37,986	50,740
Ford	4,836	4,784	137,303	222,213
F. W. D.	.....	.....	759	698
International	1,468	1,406	56,844	75,172
Mack	277	279	9,054	10,702
Studebaker	.....	48	6,437	8,570
White	284	111	10,159	12,079
Willys	.....	1,922	49,963	46,115
Other Trucks	45	40	1,855	2,733
Total—Trucks	15,430	16,312	531,848	702,224
Buses	40	97	2,074	2,748
Total—Motor Vehicles	81,079	79,256	3,177,275	4,739,282

RETAIL CAR SALES BY PRICE GROUPS*

NUMBER OF CARS

June

Price Group	1958 Units†	1958 % of Total	1957 Units†	1957 % of Total
Under $2,000	5,253	1.38	1,064	.22
$2,001 to $2,500	252,411	66.37	329,171	65.65
$2,501 to $3,500	88,880	23.37	135,502	27.03
Over $3,500	33,762	8.88	35,602	7.10
Total	380,306	100.00	501,359	100.00

Six Months

Price Group	1958 Units†	1958 % of Total	1957 Units†	1957 % of Total
Under $2,000	21,726	.98	18,518	.62
$2,001 to $2,500	1,415,040	63.92	1,857,547	62.09
$2,501 to $3,500	560,058	25.30	861,138	28.78
Over $3,500	216,899	9.80	254,598	8.51
Total	2,213,723	100.00	2,991,801	100.00

DOLLAR VOLUME OF SALES

June

Price Group	1958 Dollars	1958 % of Total	1957 Dollars	1957 % of Total
Under $2,000	$ 9,386,602	.94	$ 1,655,268	.13
$2,001 to $2,500	501,240,513	50.92	741,399,006	56.61
$2,501 to $3,500	255,055,780	25.42	384,008,564	29.32
Over $3,500	147,680,637	14.72	182,585,101	13.94
Total	$1,003,363,712	100.00	$1,309,647,939	100.00

Six Months

Price Group	1958 Dollars	1958 % of Total	1957 Dollars	1957 % of Total
Under $2,000	$ 38,623,094	.65	$ 34,270,330	.44
$2,001 to $2,500	3,310,542,867	56.13	4,172,072,473	53.27
$2,501 to $3,500	1,585,045,119	26.87	2,429,469,316	31.02
Over $3,500	964,118,978	16.35	1,195,618,957	15.27
Total	$5,898,330,058	100.00	$7,831,431,076	100.00

*—Calculated on basis of new car registrations, as reported by R. L. Polk & Co., in conjunction with advertised delivered price at factory of four door sedan or equivalent model. Does not include transportation charges or extra equipment.

†—New registrations of American made cars only. Does not include imported foreign cars.

REGISTRATIONS OF FOREIGN CARS

First Six Months

1958		1957	
Volkswagen	40,258	Volkswagen	31,243
Renault	17,663	Renault	7,334
English Ford	13,678	M. G.	6,615
Hillman	7,837	English Ford	5,792
Fiat	7,806	Metropolitan	5,140
All Others	72,125	All Others	27,120
Total	159,367	Total	83,244

1958 NEW REGISTRATIONS

Based on data from R. L. Polk & Co.

NEW PASSENGER CARS

Make	June 1958	May 1958	June 1957	SIX MONTHS 1958	SIX MONTHS 1957
Chevrolet	121,000	118,515	127,782	659,477	722,396
Ford	87,177	89,196	131,841	500,552	763,670
Plymouth	34,255	36,924	56,335	201,803	315,770
Oldsmobile	26,678	28,819	28,856	168,083	199,295
Buick	20,662	22,951	32,230	141,534	218,014
Pontiac	19,361	20,700	27,718	122,358	171,581
Rambler	17,256	16,847	8,897	78,520	43,940
Mercury	12,100	12,590	22,396	70,871	144,270
Dodge	10,926	11,924	23,183	68,726	136,133
Cadillac	10,753	11,959	11,147	68,045	73,734
Chrysler	4,886	5,299	8,554	32,437	57,263
De Soto	3,886	4,322	8,535	26,611	57,448
Edsel	3,254	3,356	.....	22,003	.....
Studebaker	3,656	3,808	5,573	20,942	31,177
Lincoln	1,938	2,327	2,402	15,468	19,328
Imperial	1,125	1,253	2,836	8,441	18,289
Metropolitan	1,149	1,289	1,084	5,723	5,140
Packard	235	252	480	1,672	3,318
Misc. Domestic	181	403	1,741	1,550	12,005
Foreign	30,129	30,751	15,468	153,644	78,104
Total—All Makes	410,607	423,484	517,043	2,368,359	3,070,875

NEW TRUCKS

Make	June 1958	May 1958	June 1957	SIX MONTHS 1958	SIX MONTHS 1957
Chevrolet	23,646	23,183	24,735	122,544	146,840
Ford	19,327	17,413	24,529	98,559	135,551
International	6,753	7,533	7,015	43,139	45,055
G. M. C.	4,392	4,733	4,651	25,554	32,047
Dodge	3,123	3,271	3,849	18,896	24,231
Willys Truck	982	987	1,201	6,220	7,619
White	873	1,131	1,253	5,928	7,971
Mack	970	1,125	1,084	5,610	6,567
Willys Jeep	497	459	540	2,800	3,068
Studebaker	353	424	492	2,252	3,789
Diamond T	225	245	267	1,400	1,719
Divco	206	175	190	1,133	1,483
Brockway	69	70	44	396	351
Kenworth	62	66	124	364	512
F. W. D.	30	19	35	207	256
Peterbilt	46	35	33	196	258
Misc. Domestic	62	71	77	402	438
Foreign	2,377	2,298	1,216	11,989	6,037
Total—All Makes	63,995	63,238	71,335	347,589	422,812

MEN
IN THE NEWS

Tuthill Spring Co.—W. R. Walker has been appointed manager of original equipment sales, and Thomas J. Moore, Jr., was named general sales manager.

Chrysler Corp.—C. G. Bauer has been appointed director of quality control for the Automotive Mfg. Group, and J. J. Wetzel succeeds him as director of quality control on the corporate manufacturing staff.

White Motor Co.—Charles S. Hale has been named regional manager for the North Atlantic region, and E. S. Hoke was made regional manager of the new regional office in Philadelphia, Pa.

General Motors Corp., United Motors Service Div.—**Thomas F. Plant** was appointed general sales manager; **Edward L. Lape,** operations director; **William M. Walker, Jr.,** executive assistant to the general manager; **Albert E. Schwerzel,** assistant general sales manager, eastern region; and **William A. Price,** Atlantic regional manager.

General Motors Corp., Guide Lamp Div.—**Byron L. Stewart** was named general manager.

Zollner Corp.—**Otto H. Adams** and **Robert B. Hawkins** were named to the board of directors.

General Electric Co. — **Robert D. Knies** has been appointed manager of manufacturing of the Commercial Engine Operation at Evendale, O.

General Electric Co. — **George F. Metcalf** was elected to the newly created office of regional vice-president—Washington Defense Activities.

Chrysler Corp. — **W. G. Hotchkiss** has been appointed director—general personnel services.

Standard Oil Co. (Indiana) — **Dr. Philip C. White** was appointed general manager of the research and development department.

Westinghouse Electric Corp.—**Frank V. Kupchak** has been promoted to manager of the standards department of the materials engineering department at East Pittsburgh, Pa.

AC Spark Plug Div., General Motors Corp.—**Moreton Price** has been appointed director of sales and contracts.

Borg-Warner Corp. — **Donald R. Spotz** was named vice-president in charge of sales for Pesco Products Div. and Wooster Div.

Norton Co.—**William A. Simonds** has been reassigned to the Western Massachusetts area, and **Robert C. Divoll** succeeds him as abrasive engineer in Texas.

Jones & Laughlin Steel Corp.—**Admiral Ben Moreell** will retire as chairman of the board on September 30, and **Avery C. Adams** was elected to succeed him.

Dodge Div., Chrysler Corp.—**Raymond Taylor** was made Dodge Assembly Plant resident engineer.

Capewell Mfg. Co.—**M. W. Hanner** was named district manager of the Southeastern territory, and **Bruce S. Williams** has become district manager in the Chicago-Detroit territory.

Du Pont Co.—**Dr. John S. Beekley** was appointed administrative assistant to the general management of the Polychemicals Dept. and **Dr. Frank C. McGrew** succeeds him as director of the department's Research Div.

Allis-Chalmers Mfg. Co. — **E. T. Cuddeback** was appointed manager, general products division sales, Southeast region.

M-E-L Div., Ford Motor Co.—**C. E. Bowie** has been named to the newly-created position of general sales manager of the division's consolidated sales office, and **George S. Coats** has been appointed assistant general sales manager.

Necrology

Dr. William F. Durand, 99, pioneer in the aviation field and a former president of the ASME, died Aug. 9.

F. H. Chapin, 83, board chairman of National Acme Co., died Aug. 5, at Cleveland Heights, O.

Charles A. Eisenhardt, Sr., treasurer of Hess & Eisenhardt Co., died Aug. 5, at Cincinnati O.

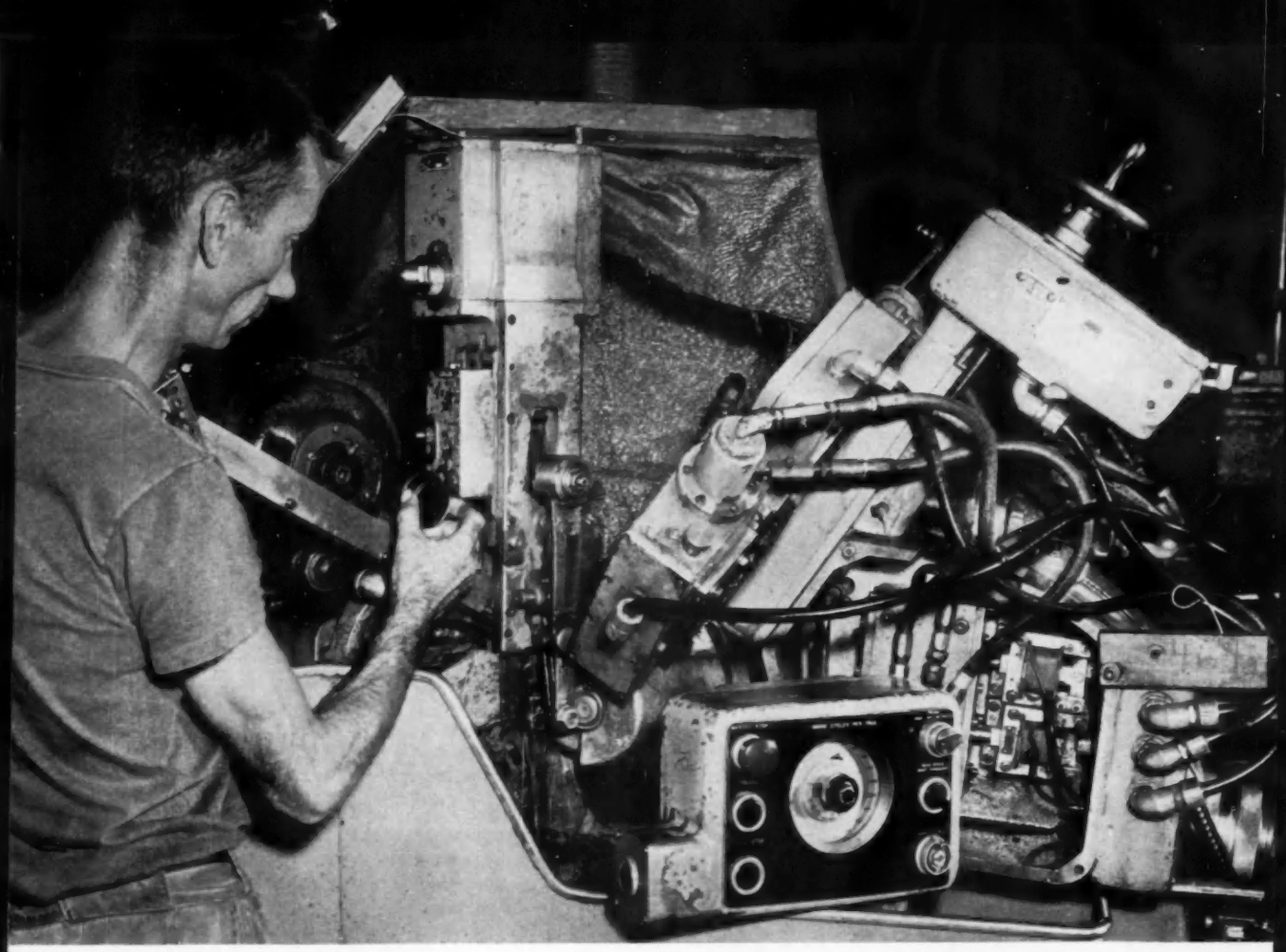
Kenneth C. Brownell, 55, board chairman of American Smelting and Refining Co., died Aug. 4, at New York City.

Carl P. Nellis, 69, retired factory manager of Inland Mfg. Div., General Motors Corp., died Aug. 2 at San Antonio, Tex.

Paul B. Taylor, 65, retired Pontiac Motor Div. engineer, died July 28, at Pontiac, Mich.

Alex L. Page, former president and general manager of Frost Steel and Wire Co., Hamilton, Ont., died July 28.

William D. Goad, 43, manager of specialty product sales for Tube Reducing Corp., died July 11.



bearing life boosted from

THREE WEEKS TO FOUR YEARS

with Texaco Cleartex Oil

Tyson Bearing Corp., Division of SKF Industries, Massillon, Ohio, extended the life of micro-centric grinder bronze sleeve bearings from 3 weeks to 4 years (and they're still going strong) using *one* oil—Texaco Cleartex B—for both grinding *and* machine lubrication.

Before Cleartex was used, machine bearings would fail in about 3 weeks, because the lubricant became contaminated by grinding oil. With Cleartex this problem simply doesn't exist. A premium quality lubricant, Cleartex is *also* a fine grinding oil. In fact, Tyson now gets as many as 20 pieces per wheel dressing, each with a better finish, compared to the 10 or 12 that were previously obtained.

You can do any machining work better, faster and at lower cost with Texaco—a complete line of cutting, grinding and soluble oils. A Texaco Lubrication Engineer will gladly help you select the right ones for your job. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write: The Texas Company, 135 East 42nd Street, New York 17, N. Y.

LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)

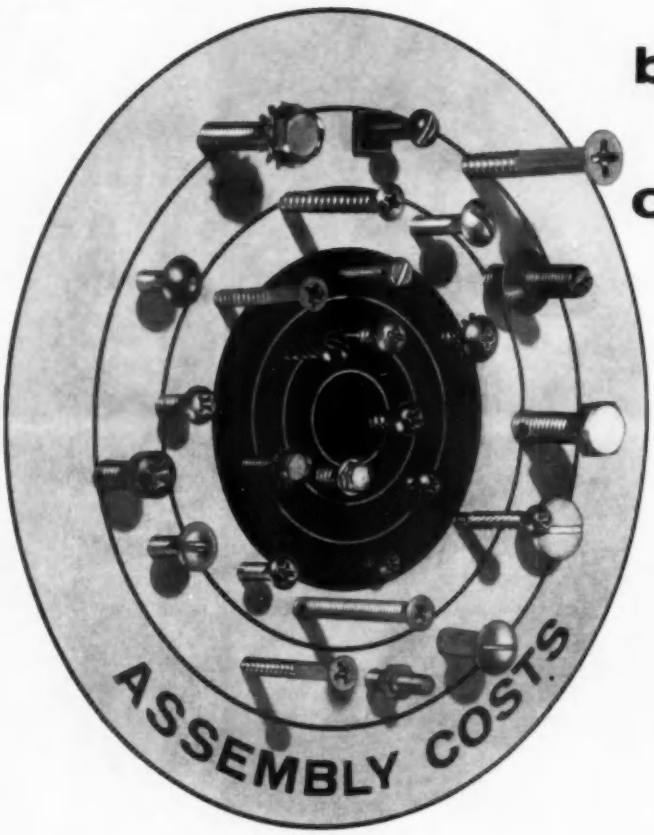
Continental can help you score more hits

on your

biggest target

for

cost reduction



Assembly accounts for up to 80% of the total cost of production. For most manufacturers, it is the biggest target for cost reduction.

If you are missing out on savings you could be making, why not get the expert assistance of Continental Assembly Specialists?

You'll find them ready and able to analyze your fastening operations and offer practical cost-saving ideas. They'll show you why assembly-men everywhere agree, ***"You can count on Continental."*** Write or phone: Continental Screw Co., 451 Mt. Pleasant St., New Bedford, Mass.

NO "FAVORITE" FASTENERS
Continental Assembly Specialists are unbiased toward any particular types . . . Continental makes all types. The fastener they recommend for your job is the one proved best by careful cost analysis.

MORE STANDARDS IN STOCK
Continental can supply any recognized standard type, style or size. Also, many fasteners ordinarily considered "specials" are available among the millions of screws constantly in stock to meet needs of Continental customers.

MORE "SPECIAL" EXPERIENCE
Continental is known throughout industry as the "specialist in specials," — leads in production of special designs. Continental is also your supply source for special-purpose fasteners, such as HOLTITE NYLOK Self-locking Screws.

MORE "SPECIAL" PRODUCTION FACILITIES
With Continental's modern, precision controlled equipment, many special shaped screws formerly machined from bar stock can be produced faster, at lower cost — with higher tensile strength and excellent surface quality.

MEMBER
SCREW RESEARCH ASSOCIATION

CONTINENTAL
SCREW COMPANY, NEW BEDFORD, MASS.
HOLTITE FASTENERS

HOLTITE PHILLIPS AND SLOTTED HEAD
WOOD • MACHINE • TAPPING
THREAD FORMING •
SEMS • NYLOK
HY-PRO PHILLIPS
INSERT BITS AND HOLDERS

HY-PRO TOOL COMPANY . . . DIVISION
RESEARCH ENG. & MFG., INC. SUBSIDIARY

Specialties of the House

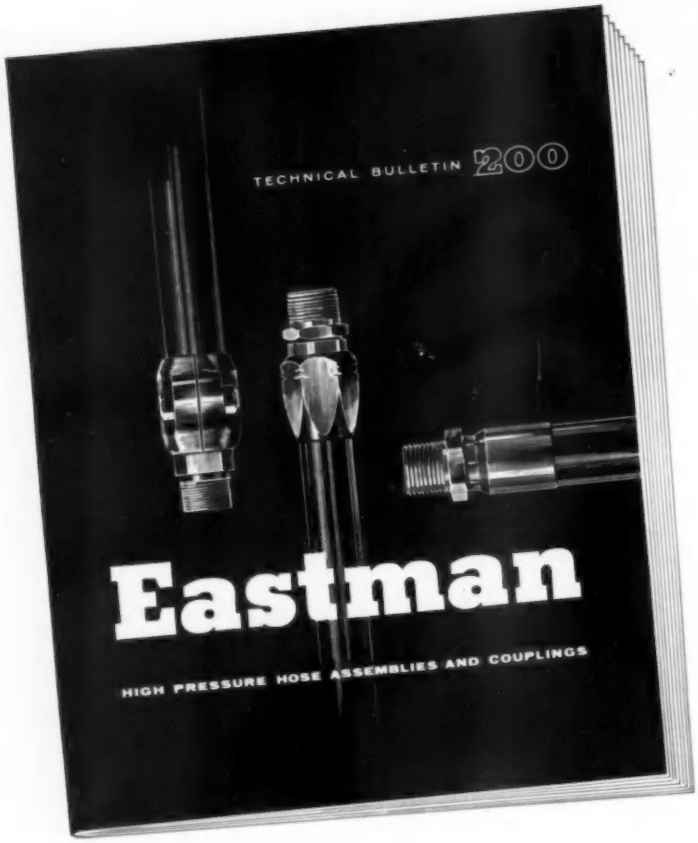
ROEBLING is a specialist in galvanizing, with practically unmatched facilities for producing galvanized wire in enormous quantities and in complete size ranges. Hot galvanized is available in sizes from .283″ to .035″. . . Roegal (drawn galvanized) from .187″ to .005″.

You *pay* for the best when you buy galvanized wire. Make sure you *get* it—specify Roebling! Write Wire and Cold Rolled Steel Products Division, John A. Roebling's Sons Corporation, Trenton 2, N. J.

ROEBLING

Branch Offices in Principal Cities
Subsidiary of The Colorado Fuel and Iron Corporation

Roebling... Your Product is Better for it



CONVENIENTLY ARRANGED TO HELP YOU MEET THE INCREASING DEMAND FOR HIGHER PRESSURES

Here's an entirely new service concept in catalog arrangement. It is designed to assist Engineers and Purchasing Agents in specifying Multi-Braid Hydraulic Hose and Tube Assemblies to meet the demand for increasing pressure requirements. With pressure as a primary consideration—the right assembly can be selected for the specific equipment on which it is to be used.

Nine major sections are devoted to assemblies suited to all types of high pressure hydraulic applications—complete with tables and specifications, including easy to read dimensional cross section drawings.

Include this new catalog in your files to make it easier to specify the proper assemblies.

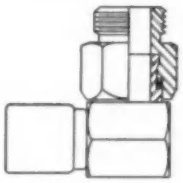
Write for Your Copy Today!

Eastman *first in the field* **MANUFACTURING COMPANY**
Dept. AI-9, MANITOWOC, WISCONSIN

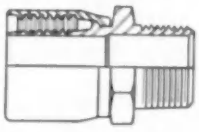
SAFEGUARDING AMERICA'S LIFELINES OF MOBILE POWER

AN INSIDE LOOK AT A *NEW BOOK*

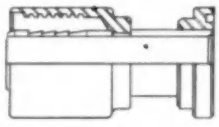
Eastman's new Technical Bulletin offers a new standard in simplified arrangement—for your convenience in specifying—according to your pressure requirements.



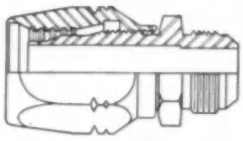
Swivel "O" Ring Male Couplings are available in 45° and 90° angles. Specifications on Page 13.



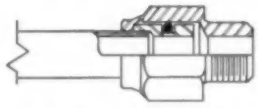
Permanently Attached Couplings for 2-wire braid hose. Specifications and Details on Page 10.



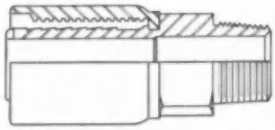
Permanently Attached Flange Head Couplings and Inserts from 0° to 90°. See complete list on Page 21.



2-Piece Reusable Couplings for all high pressure hose. Used for pressures up to 5000 lbs. See Page 25.



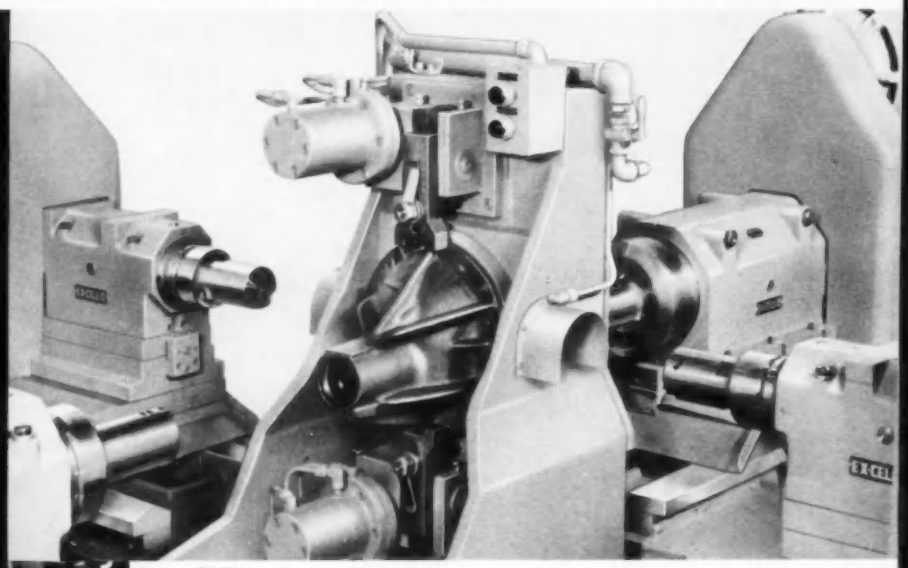
Swivel Male Tube Nut "O" Ring Assembly used on formed tubing—described on Page 30.



Permanently Attached Couplings for **Extreme** High Pressures up to 7000 lbs. working pressure, Page 12.

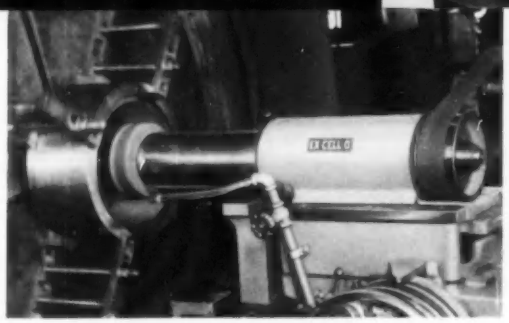
EX-CELL-O Precision Production News

COST-CUTTING IDEAS FROM EX-CELL-O CORPORATION — DEVOTED TO MINIMIZING COST OF PRODUCTION

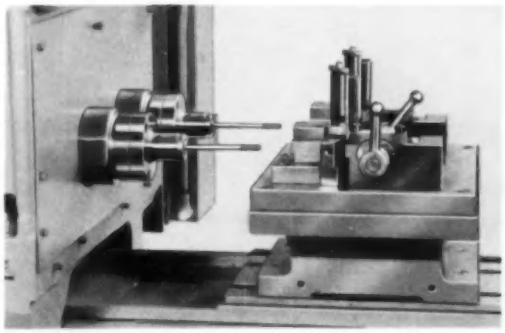


Exacting limits are held by Ex-Cell-O Precision Spindles boring pinion bearings and cross hole in this automotive differential carrier. Pre-loaded ball bearing construction of Ex-Cell-O Spindles plus sealed lubrication insure long life and low maintenance.

58-32A



Internal grinder uses belt-driven spindle to grind 10" I.D. to closest tolerances. Belt-driven Ex-Cell-O Precision Spindles are available in a full range of speeds up to 25,000 rpm.



Two Ex-Cell-O Precision Spindles are used in this Bor-Drilling setup to drill jet engine blades with extreme accuracy. Ex-Cell-O Spindles hold critical limits in either ferrous or non-ferrous metals.

Do More Jobs— More Accurately

Standard Ex-Cell-O Precision Boring and Grinding Spindles cut costs in precision production

Installed as original equipment or as replacement components, standard Ex-Cell-O Precision Spindles put job-engineered efficiency into every job—surface grinding, I.D. grinding, precision boring and other applications.

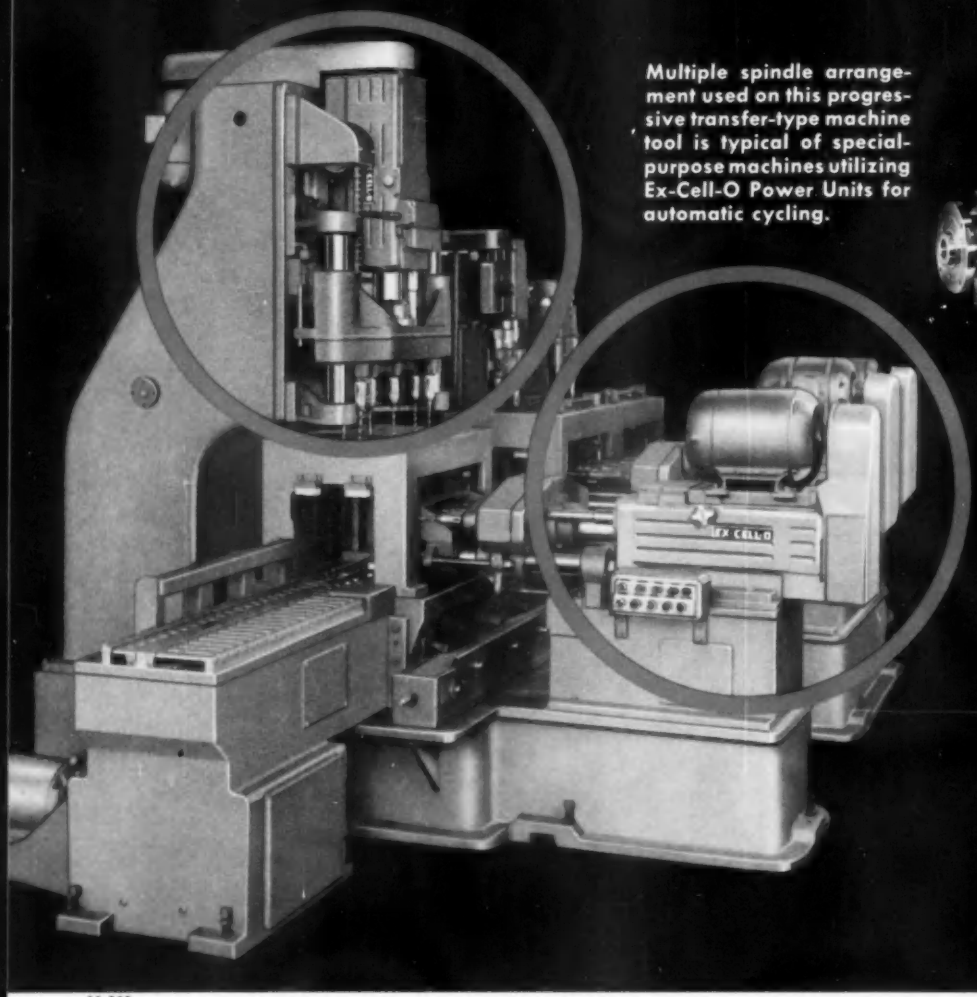
Whatever the type—belt driven, air driven or motorized, designed for standard current or high frequency applications—Ex-Cell-O Spindles have earned an enviable reputation throughout the world for precision and versatility, for long-lasting operation, and for production savings.

Pre-loaded ball bearing construction, absence of vibration and chatter and low maintenance make Ex-Cell-O Spindles first choice for close-tolerance, fine-finish work. Spindles also are available with heavy duty bearings for roughing and semifinishing operations.

Your local Ex-Cell-O Representative can give you all the details, or write direct.

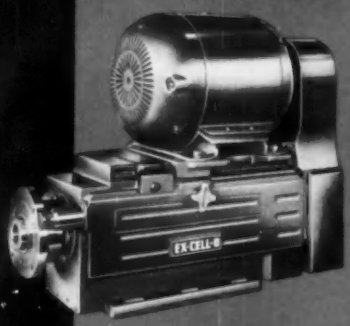
3 MORE COST-CUTTING IDEAS

EX-CELL-O PRECISION PRODUCTION NEWS

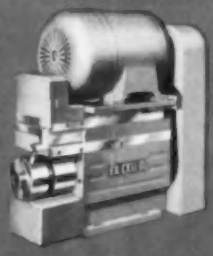


Multiple spindle arrangement used on this progressive transfer-type machine tool is typical of special-purpose machines utilizing Ex-Cell-O Power Units for automatic cycling.

58-328



STYLE 28-A HYDRAULIC POWER UNIT



STYLE 22 QUILL-TYPE HYDRAULIC POWER UNIT

STYLE 20 HYDRAULIC POWER UNIT

POWER

for Changing Production Needs

EX-CELL-O QUILL-TYPE HYDRAULIC POWER UNITS CAN BE USED OVER AND OVER AGAIN, PUTTING POWER WHERE YOU NEED IT, WHEN YOU NEED IT

Ex-Cell-O Hydraulic Power Units lower manufacturing costs even on short and medium runs by performing a variety of jobs—adapting quickly to your changing production requirements.

Used to actuate single tools or multiple spindle heads for drilling, counterboring, facing, reaming and other operations, they are designed as a compact "power package" to permit close center distances when used in-line or when rearranged and positioned radially around a fixture.

Suited to many applications, including special machines with automatic cycling, Ex-Cell-O Power Units are self-lubricated, easily installed, and they're built with famous Ex-Cell-O precision for trouble-free, long-lasting service.

Call your local Ex-Cell-O Representative or write Ex-Cell-O, Detroit, for details on the full line of Hydraulic Power Units.

This is cost-cutting— with CTW Carbide Broaches

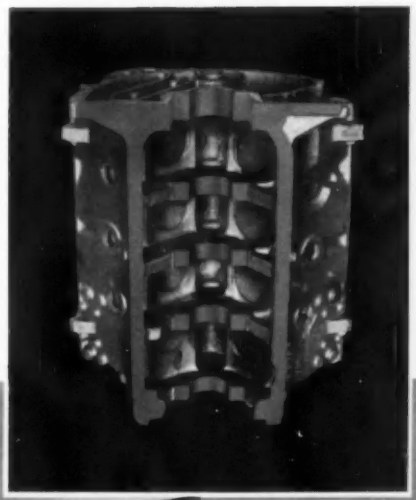
Continental Broaches increase output and reduce downtime in automobile engine block production

Greater production with less downtime are just two of the important reasons why a large automobile manufacturer uses Continental tooling for broaching of pan rail, half bores, bearing locks and parting faces of V-8 engine blocks.

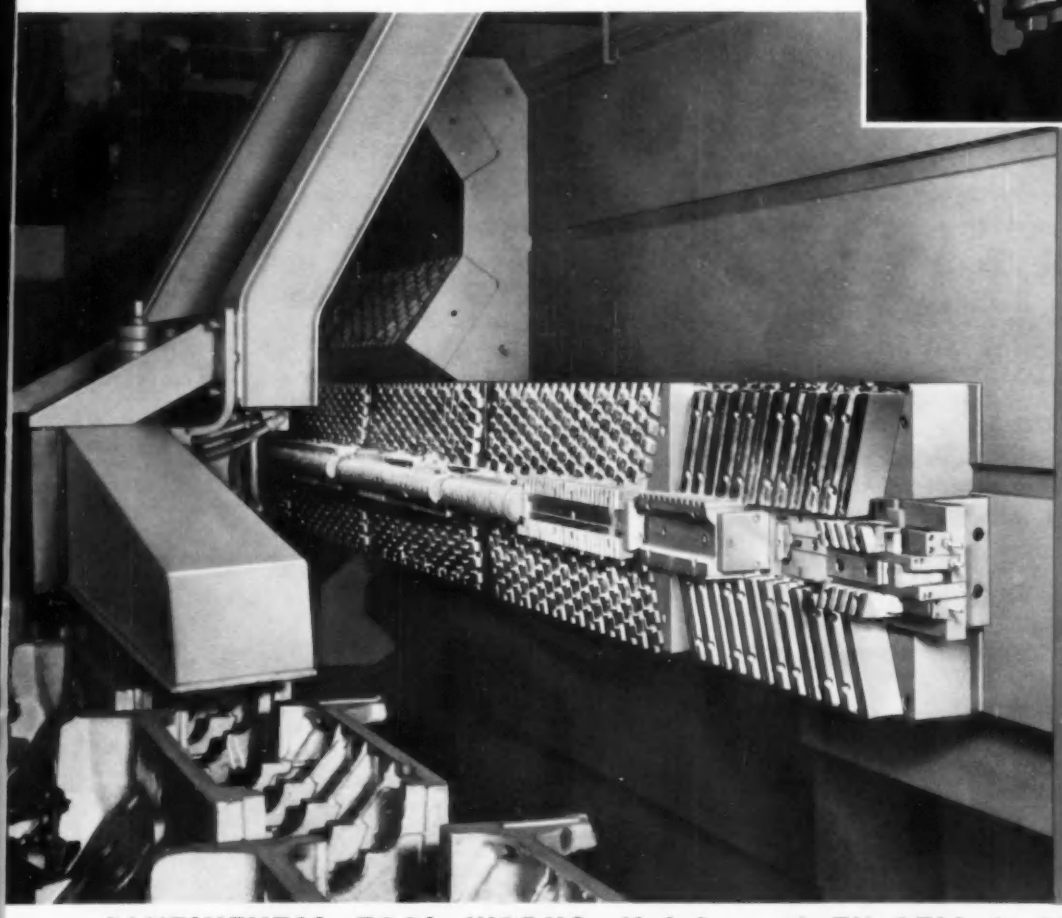
Removing a maximum 3/16" stock in a single pass, this five-section, combination half-round and face broach uses carbide-tipped tool bits and broach inserts to semifinish and finish 20,000 to 22,000 cast-iron blocks between tool resharpening.

This automotive operation proves again why the production savings made possible by Continental tooling makes the "best cost less" than ordinary broaches.

58-32C



Above: In a single pass, multiple surfaces of this cast-iron engine block are semifinished and finished. Maximum stock removal is 3/16".

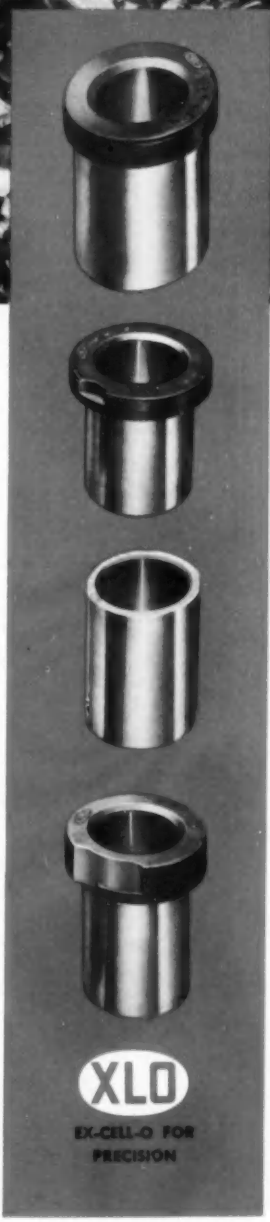


Left: Continental Broaches used in this horizontal surface broach machine are made up of five sections combining half-round and facing broaches. Tool bits and broach inserts are 100% carbide-tipped.

CONTINENTAL TOOL WORKS division of EX-CELL-O CORPORATION

EX-CELL-O PRECISION PRODUCTION NEWS

58-32D



Make the scrap-pile test!

Start using Ex-Cell-O Drill Jig Bushings today—then watch how worn-out bushings disappear from your scrap-pile!

The reason is simple: Ex-Cell-O Drill Jig Bushings last longer because they're made better!

The answer lies in the chrome-alloy bearing steel used in Ex-Cell-O Bushings; in up-to-date automatic heat treating methods; in hole hardness quality-controlled to uniform 62-64 Rockwell "C"; and in Ex-Cell-O's own high standards for precision-ground finish inside, outside and under the head for perfect seating.

All this—plus immediate delivery to your plant from the large Drill Jig Bushing inventories Ex-Cell-O maintains at key points throughout the country.

You get fast service on special sizes, too, because Ex-Cell-O stocks many semifinished bushings in addition to the more than 10,000 standard sizes always on hand.

For "same-day" shipment, order from Ex-Cell-O Corporation at Detroit, New York, Cincinnati, Downey, Calif., or London, Canada. Call your local Ex-Cell-O Representative or write direct for an Ex-Cell-O Drill Jig Bushing catalog today.

EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN

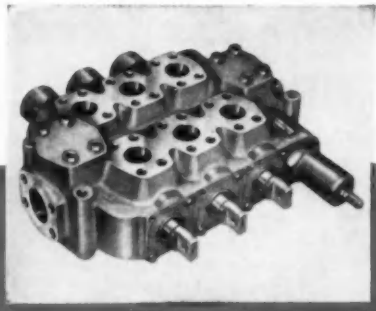
MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING AND BORING SPINDLES CUTTING TOOLS • TORQUE ACTUATORS RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

XLO
EX-CELL-O FOR PRECISION

Save Power on Your Mobile Equipment with—

HYDRECO®

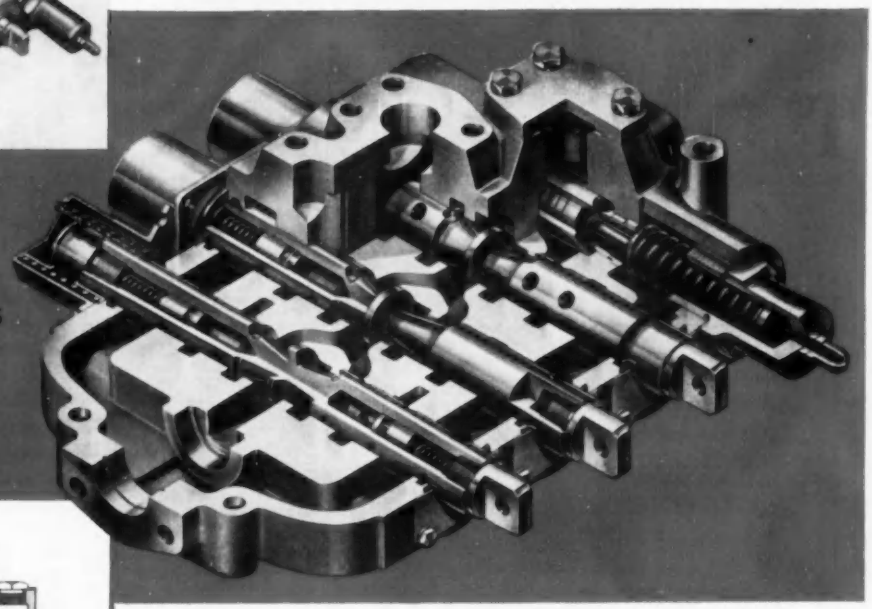
HOLLOW PLUNGER FLUID POWER VALVES

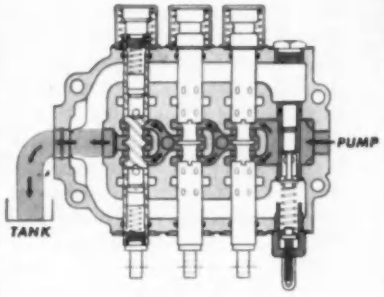


5 to 150 gpm

1 to 6 Plungers

2000 psi





Schematic sketch of the V-26 three-plunger HYDRECO Valve showing the exclusive Hollow-Plunger design. Note the restriction-free idling flow path and exclusive, patented check valves built into the Hollow-Plungers to prevent back-flow from cylinders or fluid motors.

When you consume fluid power needlessly you suffer not only waste of power, but also excessive heat generation. This multiplies many problems—wear, pump slippage, and deterioration of seals and hydraulic fluid.

HYDRECO Valves are designed with exceptional efficiency to take advantage of this opportunity to economize. They provide an idling flow path around the plungers that is more than ample . . . actually twice normal size. Back pressure during idling is negligible . . . horsepower consumption is therefore less.

This is but one of many significant plus factors in HYDRECO engineering. It also is one of the reasons why the HYDRECO Plunger design gives greater dependability, power-saving control and ease of operation to outstanding earth moving, farm and materials handling applications.

Member NFPA

NFPA NATIONAL FLUID POWER ASSOCIATION

Write . . .

for detailed information on the full line of HYDRECO Hollow Plunger Valves.

HYDRECO DIVISION

THE NEW YORK AIR BRAKE COMPANY

KALAMAZOO • MICHIGAN

Hydreco Division
The New York Air Brake Company
9005-9 East Michigan, Kalamazoo, Mich.

Please send me bulletins fully describing HYDRECO Valves for Mobile Equipment.

Name_____

Company_____

Address_____

City_____ Zone_____ State_____

MODERNIZATION of Production Equipment A MUST

THE selection of machine tools and associated capital equipment is a management problem of major proportions in the automotive industries. Competition is so intense that the very survival of an automotive supplier depends upon advanced methods, optimum economy, and low costs. Under such conditions major improvements in methods, in tooling, and in machinery of advanced design all combine to render even a rather new piece of equipment obsolete.

It must be recognized, however, that manufacturers in the automotive industries family represent a complex of entirely different types of operations. Few generalizations and even fewer formulas will apply across the board. On the one hand are the larger parts makers—commercial engine builders, producers of axles and transmission, etc. Although this group accounts for a large dollar volume of product, the variety of types and sizes required to satisfy their customers' needs reduces materially the numbers in which individual parts and assemblies are manufactured. Consequently, most parts makers depend, in the main, upon general purpose machines, and employ special machines only on carefully selected operations. Apart from good material handling methods such companies, as a rule, cannot afford the kind of automation that is characteristic of the major passenger car producers.

The same is true of truck and tractor builders, although there is more opportunity for this group to take advantage of special machines and some transfer equipment.

Nevertheless, the replacement of existing machinery is a major responsibility. Not only is there the element of obsolescence due to the impact of new methods and radical machine tool advances but there is

FIG. 1

Supersedes Page 20 of 9/1/56 — Page 20 of 9/19/56

ENGINEERING ECONOMY STUDY — STUDY NO. 55-076

Division: Imaginary	Works: Tapco	Capital Exp. Project: 11-55-007
Project Description: Warner & Swasey #2 AC Chucker		
Department: 1120 Pumps	Product: Oil Burner Pump Body FR-2:54	Est. Life of Job: 15 Years

1-PRESENT FACILITY		2-PROPOSED FACILITY	
a. Description	W & S Turret Lathes (2)	a. Description	W & S Automatic Chucking Machine
Mod. Size	#4	Mod. Size	#2 AC
Date Mfg.	1942	Total Serv. Life	11 Years
b. Net Value	$4,250	b. Installed Cost	$25,000
	$3,960		$25,800
c. Usage	13-1/2 Hrs./Day	c. Usage	4-1/2 Hrs./Day
d. Capital Addition	$2,000 For 4 Years		4 Hrs./Day
e. Interest, 10% x Net Value	$425 / $396	g. Net Salvage Value	$1,500
f. Next Year Salv. Loss	$500 / $500	h. Percent Salvage (g ÷ b)	6 % / %
g. 10% Int., Cap. Add.	$200 / $200	i. Chart Percent	23 % / %
h. Cap. Add Prorated	$500 / $500		
(a)Next Year's Capital Cost (b + f + g + h)	$1,625 / $1,596	(d) Next Year's Composite Cost (b x i)	$5,750 / $5,934

3-OPERATIONAL COMPARISON

	Present		Proposed	
Operating Costs				
Direct Labor	$16,500	$14,850	2,710	$2,295
Indirect Labor				
Set Up			325	293
Material				
Maintenance	500	500	50	50
Tools/Exp. Items	7,200	6,480	4,800	5,100
Power Consumption	852	767	250	212
Floor Space				
Property Tax	64	64	397	410
Rework/Scrap	960	864	720	648
Downtime				
Delete/Add. Oper.				
Fringe Benefits	3,510	3,159	658	565
Sub Contract Costs				
Others				
Income Loss		1,500		
Totals	$29,586	$28,184	$9,910	$9,573
(c) Excess Operating Cost of Present Facility (Present Minus Proposed)		$19,676		$18,611

4-GAIN FROM CAPITAL EXPENDITURE			5-COMPARISON FACTOR	
a. Next Year Gain (a Plus c Minus d)	$15,551	$14,273		
b. Net Investment (7h Minus 7e)	$20,750	$21,840	.75	.65

Prepared By: John J. Smith	Date: 8/24/56	Date: 7/7/56
Dev. Ind. Eng.: Robert Jones	Date: 8/27/56	Date: 7/15/56

Here is a leaf from the Thompson-Products Engineering Economy Manual. It shows a purely fictitious example to indicate the method of evaluating a replacement machine.

By Joseph Geschelin

At right is working chart used by Thompson Products in making an engineering economy study. The chart provides a standard means for finding the composite cost of a new machine, taking into consideration the standard service life and per cent salvage at a given life.

FIG. 2

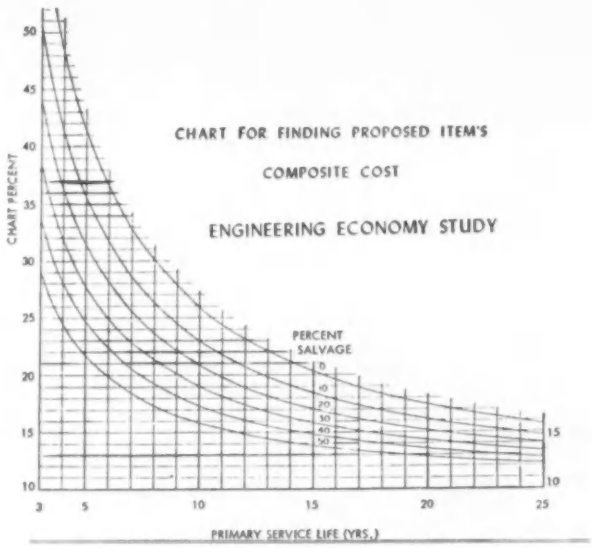


FIG. 3

ALLIS-CHALMERS MFG. CO.

Date

CAPITAL EQUIPMENT REPLACEMENT ANALYSIS

WORKS

1 Subject of Analysis:

2

3 Anticipated Rate of Production:

	PROPOSED EQUIPMENT	EXISTING EQUIPMENT
4	Description:	Purch. Date: Tool No.
5		Description:
6	Est. Primary Service Life: Years	
7	Est. Terminal Salvage Value = (X) = $	Years of life to Date: Installed Cost:
8	Est. Cost Installed = (Y) = $	Location: Dept. No.
9	Terminal Salvage Factor = X/Y = %	Intended Disposal: Resale, Salvage or Conversion Value $

	FACTOR	PROPOSED EQUIPMENT	EXISTING EQUIPMENT
10	Direct Labor (For Anticipated Production):	$	$
11	Indirect Labor (For Anticipated Production):		
12	Defective Material Labor & Works Expense:		
13	Down Time:		
14	Power Consumption:		
15	Tooling:		
16	Supplies:		
17	Floor Space: (if usable)		
18	Property Taxes & Insurance:		
19	Normal Maintenance:		
20	Special Repairs:		
21	Sub Contract Costs:		
22	Other Items (explain on reverse side):		
23			
24	Totals:	B $	A $
25			B $
26	Next Yrs. Variance in Operating Cost: (A Minus B):		C $
27	(Next Years Capital Cost of Retaining Existing Equipment)		
28	Restorative Repairs $ / Years Effective + (Restorative Repairs $ × 6%)		D $
29	Resale, Salvage or Conversion Value of Existing Equipment $ × 6%		E $
30	Salvage Value Loss, Next Year		F $
31	Total Next Yrs. Cost for Existing Equipment (C + D + E + F)		G $
32	Total Next Yrs. Cost for Proposed Equipment, Chart % + Int. 6% Total % × $ Est. Cost Installed		H $
33	First Years Gain (+) or Loss (—) thru replacing existing equipment (G-H) (taking into account Depreciation, Loss of Efficiency and 6% return on Investment)		

Approved by: Date: Calculated by: Date:

(Use Reverse Side for Calculation)

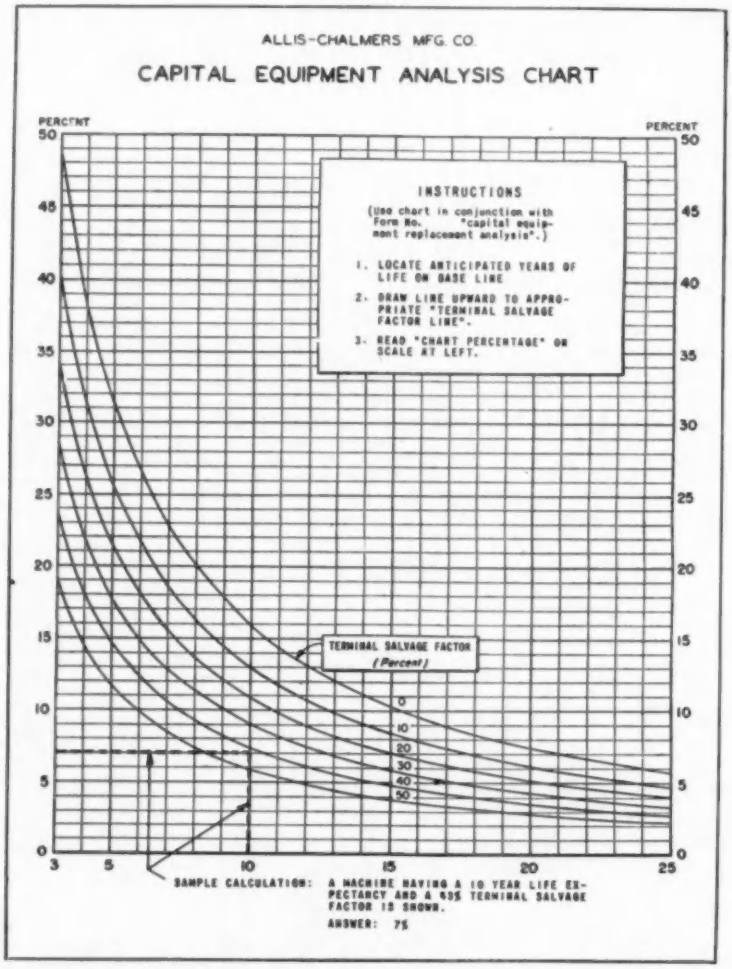
Standard form used at Allis-Chalmers in making a Capital Equipment Replacement Analysis.

the added problem of tightening quality control as well as the demand for higher productivity. Moreover, intensively used machinery takes abuse and suffers from wear and tear. Here is an area where it is imperative to take a close look at the cost of maintenance, frequency of maintenance, and the actual cost of down time with its incidental loss of production.

At the same time it is clear that automotive producers do not consider the AGE of a machine as a criterion of replacement. Age may be considered a symptom or a signal that a closer look is indicated. But age does not trigger an impulse to buy a new machine. That is a general consensus.

As a matter of fact, in plants where component parts are produced in relatively small numbers, even dramatic new developments may not justify the replacement of older existing equipment. Perhaps the following comment from Fuller Manufacturing Co. will illustrate this point: "We have what may be termed a fairly large number of older machine tools and because of the way our work centers are set up—where one man operates a group of two, three, or four machines—it is often difficult to show the savings necessary to justify a new machine for the same job. We have made estimates recently comparing a new machine method with our older general purpose machines and have found the advantage to be with the older machines where one operator takes care of say four

FIG. 4


ALLIS-CHALMERS MFG. CO.
CAPITAL EQUIPMENT ANALYSIS CHART
PERCENT
PERCENT
INSTRUCTIONS
(Use chart in conjunction with Form No. "capital equipment replacement analysis".)
1. LOCATE ANTICIPATED YEARS OF LIFE ON BASE LINE
2. DRAW LINE UPWARD TO APPROPRIATE "TERMINAL SALVAGE FACTOR LINE".
3. READ "CHART PERCENTAGE" ON SCALE AT LEFT.
TERMINAL SALVAGE FACTOR (Percent)
0
10
20
30
40
50
SAMPLE CALCULATION: A MACHINE HAVING A 10 YEAR LIFE EXPECTANCY AND A 93% TERMINAL SALVAGE FACTOR IS SHOWN.
ANSWER: 7%

Allis-Chalmers uses this Capital Equipment Analysis Chart which is quite similar to the one employed by Thompson-Products (Fig. 2). Note that the abscissa is given in terms of standard life, also that they use a terminal salvage factor.

of them. The reason for this is that in our operation each of the machines in the group will be set up for an entirely different part."

Because of the complexity of the problem as well as the diversity of management philosophy, we have been in touch with a representative group of manufacturers and have asked them for comment on their approach to machinery replacement. A sampling follows.

1—Is There a Replacement Program?

Generally speaking few companies have a formal replacement program in the sense that action is taken routinely. On the other hand, all respondents say that equipment is reviewed regularly, new equipment purchases as well as replacement of older equipment being made whenever warranted.

Allis-Chalmers reports that it has a definite replacement program in effect. And it is of interest that Caterpillar Tractor Co. has adopted the MAPI formula.

2—Is There a Continuing Study of Equipment?

Our sampling indicates that many automotive plants have established some means of policing their machine tool assets. It is done in various ways, depending upon the size and activity of the company. But the objective definitely is to make sure that existing equipment is capable of paying its way in competition with advanced methods. It will be shown later that the cost of maintenance, the frequency of maintenance, and the history of down time have a major effect upon the decision to replace.

Let us now take a look at the management scheme employed in some of the plants.

FULLER MFG. CO.—Here the master mechanic is required to make a survey of each department, in consultation with the foreman, at the start of each year to determine further action. Where borderline or questionable items are encountered, the master mechanic consults with the factory manager and shop superintendent.

CATERPILLAR TRACTOR CO. — This company has a task force charged with the responsibility for studying individual machines and determining their usefulness.

CLARK EQUIPMENT CO.—Here we have an example of a decentralized operation with a number of plants in different locations, making different kinds of products. The master mechanic of each plant is responsible for keeping track of machine performance in his plant and for determining where there may be a need for replacement. Each one then reports to the vice-president in charge of properties for screening of such requirements. The latter will request the necessary appropriation when a definite need has been established.

DANA CORP.—is another divisionalized setup and here too the master mechanic of each division is responsible for a continuing study of existing equipment. Supplementing this formal arrangement, the vice-president in charge of manufacturing has an engineer on his staff who makes his own continuing survey of equipment throughout all corporation plants.

ALLIS-CHALMERS MFG. CO. — This organization has placed the responsibility in the hands of the plant engineering department of

each Works. They study the condition of all existing equipment and make recommendations to justify replacement.

THOMPSON - PRODUCTS — Being a large decentralized operation, it depends upon the divisional industrial engineering department for studying machinery replacement. All recommendations leading to new equipment buying are embodied in the yearly capital expenditure program. A noteworthy feature of this setup is that the central Industrial Engineering department has published a formal manual called the "Engineering Economy Study" which provides complete and detailed instructions for evaluating existing equipment and justifying replacement.

EATON MFG. CO.—All studies of existing machine tools are made by the Plant Engineer and his staff in each Division of the company. In making these studies the plant engineer frequently consults with the Industrial Engineering Department and plant manufacturing personnel. When a recommendation is made to replace a piece of equipment, it is reviewed by a committee composed of the plant engineer, general superintendent, industrial engineer, and the purchasing agent. This group, called the Equipment Policy Committee, may request the advice of the plant controller and other staff personnel.

3—To What Extent Are Historical Records Employed?

All respondents are unanimous in reporting that a card record or inventory form has been set up for each piece of capital equipment. Naturally, the forms vary in kind and content for each organization. Some of this detail is described below.

FULLER MFG. CO. — Each machine tool in the plant is numbered and has a separate card record. Here the tool room and maintenance departments have been combined to effect better control. The card record is set up mainly to keep track of all major repairs. Such information, bearing on machine tool condition, influences the subsequent action in setting up replacement programs.

CATERPILLAR TRACTOR CO. — maintains a card record for all capital equipment.

CLARK EQUIPMENT CO.—maintains a card file on all capital equipment. They have a system of IBM reports which accumulate all costs for each machine. These are posted on the card for later reference in appraising the usefulness of a given item.

DANA CORP.—keeps a card record for each item of equipment. This includes a record of maintenance periods, the cost of maintenance, down time, etc.

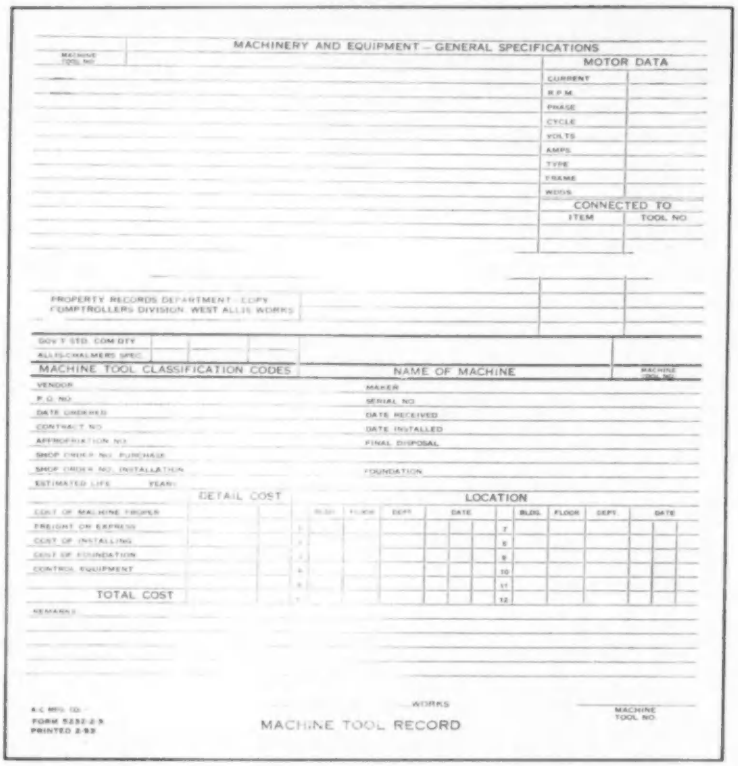
ALLIS-CHALMERS—has a standard form for recording the history of each piece of equipment. In addition to the basic information shown on this form, it also contains a record of the cost of maintenance.

THOMPSON-PRODUCTS—maintains a complete record of each machine. It is complete down to recording maintenance periods, the cost of maintenance, down time, etc. This information is accumulated on IBM cards for posting on the record. Besides this, the company has developed an elaborate preventive maintenance program which is handled on IBM equipment.

EATON MFG. CO.—Complete equipment records are kept in the form of two cards in an Acme Index file. One card shows the purchase date, purchase price, installation cost, and pertinent data relating to each piece of equipment. The second card accumulates the cost of all labor and material required for maintenance and repair, together with a description of the work performed.

(Continued on next page)

FIG. 5



Machine tool record used by Allis-Chalmers to provide a historical record for each item.

FIG. 6

EQUIPMENT ANALYSIS AND OPERATIONAL COST COMPARISON ON AN ANNUAL BASIS

Plant_____ Replacement _____ Date_____ Number_____
Additional Equip._____ Dept._____ RFA No._____
Cost Savings _____

7 %
1 Subject of Analysis_____
2 _____
3 _____
4 Cur.Avg. Rate of Production per Mo._____ Proposed Average Rate of Prod. per Mo._____
5 Current No. of Hrs. Operation per Mo._____ Proposed No. of Hrs. per Mo._____

A - EXISTING EQUIPMENT	B - PROPOSED EQUIPMENT
6A Description_____	6B Description_____
7A Mach. No._____ Date Mfg._____	7B Purchase Cost $_____ Installation $_____ Total Cost $_____
8A Acct. No._____ Date Purch._____	8B Useful Life_____
9A Suggested Disposal_____	9B Est. Salvage Value_____
10A Salvage Value_____	

COST ITEMS	(SHOW DIFFERENCE ONLY AND ON AN ANNUAL BASIS) A Existing Equipment Advantage	B Proposed Equipment Advantage
11 Prod. Labor (for Proposed Production)	$	$
12 Production Material		
13 Set-up Time		
14 Nonproductive Labor		
15 "Fringe" Benefits		
16 Ordinary Maintenance		
17 Tool Cost (Replacement & Maintenance)		
18 Supplies		
19 Scrap		
20 Downtime		
21 Power Consumption		
22 Taxes & Insurance		
23 Depreciation 6%		
24 Others (Describe)		
25 TOTALS	$	$
26 Savings per Year (25B -25A)		$
27 Savings per Year without Dprn. (26-23A) or (26 -23B)		$

PAYBACK COMPUTATION

28 Capital Expenditures (Line 7B Total Cost)	$
29 Durable Tooling (Use 40% of Total Cost)	$
30 Total Invested	$
31 Total Savings per Year (Line 27 x 40%)	$
32 Time Required to Return Investment Excluding Depreciation (Line 30 ÷ 31)	_____ years
33 Estimated Cost for Overhaul of Existing Equipment	$
34 No. of Years Useful Life after Overhaul	
35 Value of Cutting Tools, Ga es & Repair Parts Obsoleted	$
36 Amount Required for Cutting Tools, Gages & Repair Parts to put New Machine in Operation	$

Analysis By:_____ Approved by Plant Manager_____ Date_____
Form No. 87117

Dana Corp. uses this form for Equipment Analysis to determine whether replacement of an old machine is justified.

4—What Formula or Other Basis Is Used in Justifying Replacement?

The general consensus is that few companies use a formula, as such, in determining the need for replacement. Instead, they employ special yardsticks depending upon the philosophy of each organization. Comments are given below.

FULLER MFG. CO. — Generally speaking, when purchasing machine tools on a cost reduction program, they base the decision on the amount of direct labor savings as well as the time required to pay for the new machine out of such savings. AGE of the existing machine is not considered nor does it have a bearing on whether replacement is made. If an old machine is doing the job economically and if repair and maintenance costs are not considered excessive, it remains on the job. On the other hand, replacement is justified when a given machine no longer produces to acceptable quality levels at direct labor costs consistent with efficient operation. Too replacement is justified when maintenance and repair costs are at such levels that it becomes cheaper over a period of two years to purchase a new or used machine.

CATERPILLAR TRACTOR—Age of the machine is considered but is not an important factor. What is important is the ability to produce efficiently. The usefulness of a machine is determined by the cost of maintenance, the cost of overhaul, and incidence of down time.

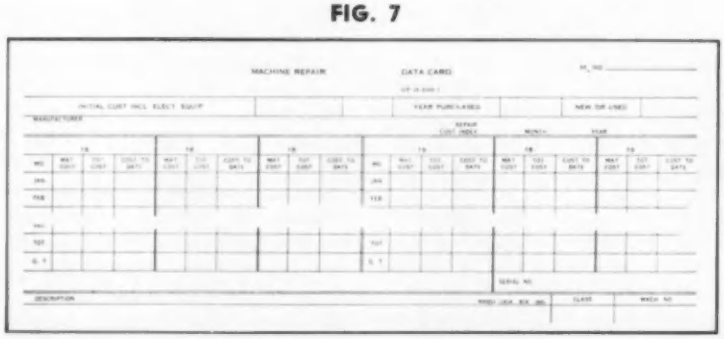
CLARK EQUIPMENT — Annual replacement practice is predicted solely on the condition of the machine and its ability to handle the job for the coming year. Age is given no weight whatever.

DANA CORP. — Machinery replacement is determined by many factors including—the influence of new methods, new tooling developments, and other considerations based upon engineering economy. The company employs a special form which is used in studying engineering economy.

ALLIS-CHALMERS — has a special formula for justifying replacement on the basis of engineering economy. Age is given weight only as a criterion of obsolescence and wear and tear. All of the factors are weighed by means of the Capital Equipment Replacement Analysis reproduced here. It takes into account the savings which would result if existing equipment

(*Turn to page* 141, *please*)

FIG. 7



Machine Repair Data Card used by Caterpillar Tractor Co. The items on the face of the card are self-explanatory.

BORING
BROACHING
DEBURRING
DRILLING
GRINDING
HONING
MILLING
PROFILING
TAPPING
TRANSFERRING
TURNING

Machine Tool Section

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 139

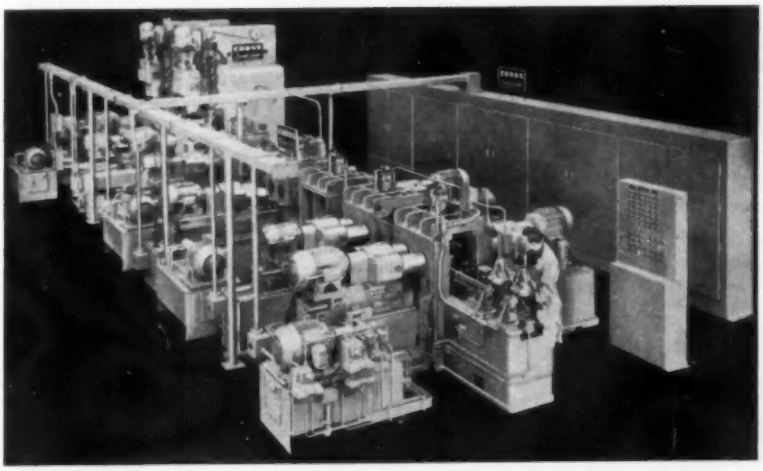
ROTO-FINISH CO.

SURFACE FINISHING MACHINE—The Roto-Ram surface finishing machine has been designed for handling large parts, such as spars and other units of high fineness-ratio. Its basic principle of operation is to allow the chip mass to remain stationary: the part to be finished is buried within the chip mass and relative motion between the two is achieved by applying a reciprocating action to the part.

Requirement that initiated the development of this machine was the need to reduce the amount of time spent on deburring and removing machining marks from high-tensile steel spar-booms approximately five feet in length and weighing from 50 to 52 lb.

Tank is eight feet long and two feet wide. Frame carrying the workpiece fixture is moved backwards and forwards by action of hydraulic ram.

Circle 25 on postcard for more data



THE CROSS CO.

TRANSFER MACHINE—An unusual arrangement of precision finishing operations is featured in this Transfer-matic, which bores axle housings with differential bearing caps assembled. The machine has a rated capacity of 90 pieces per hour at 100 per cent efficiency and each cycle produces two finished axle housings.

Circle 27 on postcard for more data

AMERICAN CHAIN & CABLE CO., INC.

CUTTING UNIT—Almost any ferrous or non-ferrous metal can be cut by a small, heavy-duty high speed dry abrasive cutting machine made by Allison - Campbell Div., American Chain & Cable Co., Inc.

Designed for use in metal working shops, factories, mills, etc., the unit has the capacity to cut metals of practically all analyses up to 2 by 2 in. solids, 3 in. standard pipe, 3 by 3 in. angle iron and 4 in. channels. Cuts are made at the rate of 3 to 6 seconds per sq-in. of metal.

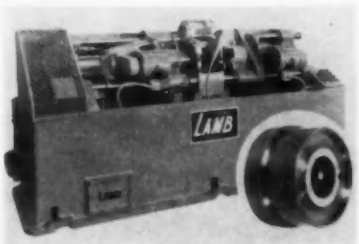
Circle 26 on postcard for more data

F. JOS. LAMB CO.

BURNISHING MACHINE—In the automatic cycle of a new burnishing machine two opposing faces of a cast iron transmission drum are burnished at the rate of 360 pieces an hour. Microfinish is improved from 100 RMS to 15-25 RMS with minimum change in dimension.

Machine features include burnishing tool pressure equalization, minimum change in part dimension, maximum tool life, and ease of part change.

Circle 28 on postcard for more data



Lamb automatic burnishing machine

Sheffield Corp. Matrix 61, fine pitch gear grinder occupies 70 by 70 in. space

THE SHEFFIELD CORP.

FINE PITCH GEAR GRINDER—The Matrix 61 fine pitch gear grinder is capable of grinding 200 diametrical pitch gears. The teeth are ground from the solid by the Crushtrue process. The grinding wheel, similar to a large diameter hob, or worm, has the basic rack form incorporated into its periphery. Thus, the machine is of the full generating, continuous indexing type.

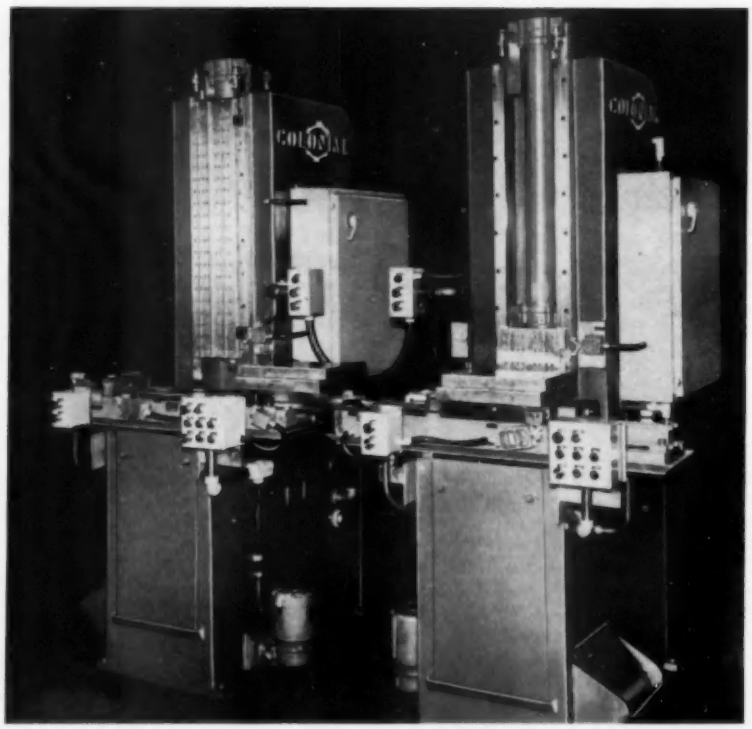
Significant machine specifications include maximum pitch of 16 DP, minimum pitch of 200 DP. The maximum diameter of work is 6 in., minimum is 0 in. Net weight is 4000 lb.

Circle 29 on postcard for more data

ENGELBERG, INC.

ABRASIVE BELT GRINDER—The Engelberg Model 696 abrasive belt grinder, available with from two to six or more individually adjustable grinding heads, offers an extensive capacity range, handling parts up to 5½ in. maximum width and 6½ in. maximum thickness. The machine's conveyor belt, which carries parts under the grinding heads, is adjustable for feed rates from 0 to 67 fpm.

Circle 30 on postcard for more data



Colonial broaching machines work as a unit with mutual fixturing and controls

COLONIAL BROACH & MACHINE CO.

RAM-PRESS BROACHING UNITS—Two standard ram-press broaching machines, in the 4-ton, 42-in. stroke model, mounted side by side form a unit that enables one operator to run both machines in small part production operations. The units are four-way machines for surface broaching, internal push broaching, internal pull broaching and press work.

Physical relationship of the two machines is held by the mounting installation and the machines are electrically interlocked. Both machines broach at 60 sfpm and use a broach-return speed of 120 fpm. The tables are of the side-shuttle type, interlocked for directional movement control. Sequence for each machine is shuttle out, load, shuttle in, broach. An interlocked electrical circuit keeps the machine cycles out-of-phase with each other. The combine is controlled from a central pendant through a quick-disconnect cable. Each machine is equipped with a control panel so that they can be used as separate units in independent operation.

Circle 31 on postcard for more data

MICHIGAN TOOL CO.

GEAR FINISHING MACHINE — This gear-finishing machine, Model 999, finishes hardened small and medium sized gears up to 12 in. in diameter to quiet operating smoothness with abrasive throwaway tools.

It is equipped with heavy-duty head and tailstock centers. Maximum length between centers is 24 in. The finishing tool mount is on an adjustable head supported by precision bearings and is outboard mounted.

Circle 32 on postcard for more data

GIDDINGS & LEWIS MACHINE TOOL CO.

RADIAL DRILLING MACHINES — Three optional head designs are offered with a new series of radial drilling machines. The head designs include: manual lever shift control, and partial and complete hydraulic pre-selection of speeds and power feeds. They are available with 13, 15, 17, and 19-in. diam columns; 4, 5, 6, 7 and 8-ft arm lengths; 36 spindle speeds up to 2300 rpm; and 18 power feeds from 0.004 to 0.125 in. with six positive geared tap leads.

Circle 33 on postcard for more data

SUPERIOR HONE CORP.

HONING MACHINE — Named the Model "AM," a tri-purpose honing machine has been designed for precision production runs, tool room work and salvage operations. It measures 48 in. high by 28 in. wide by 36 in. deep.

Speeds are variable from 250 to 1400 rpm. The drive, coolant tank and ½ hp, 110 v, 60 cycle, single phase motor are completely enclosed in the heavy steel base which has a louvered cover to provide ventilation.

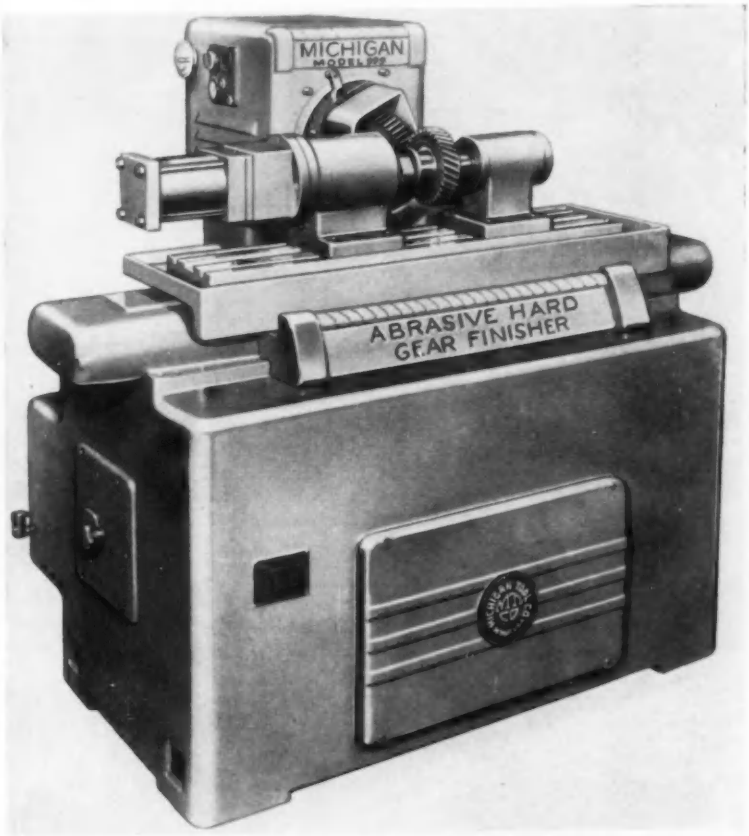
Circle 34 on postcard for more data

SUNDSTRAND MACHINE TOOL CO.

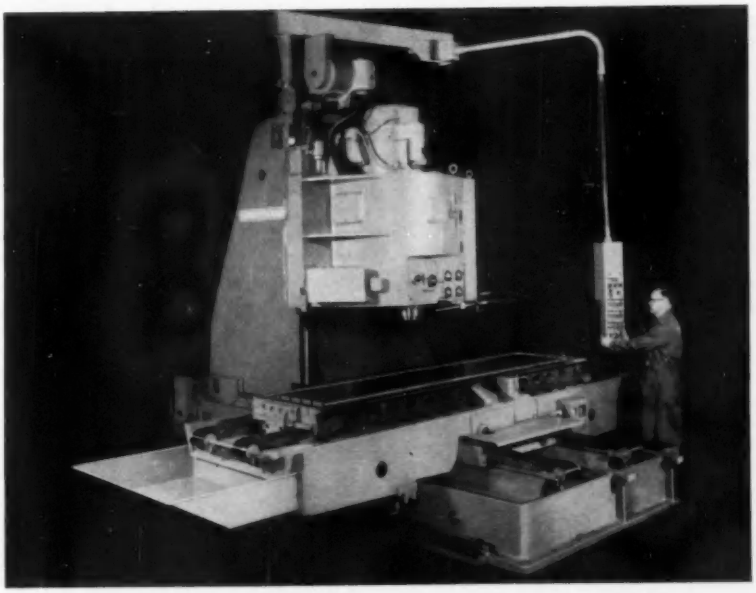
VERTICAL MILLING MACHINE — The OM5 vertical Rigidmil designed for heavy cuts on large work pieces has longitudinal, transverse and vertical feed. It has a 50 hp vertical head mounted on a fixed column for maximum rigidity under heavy cuts. Saddle and table are also carried on a fixed base.

A swinging pendant, adjustable to any operating position around the machine, provides quick pushbutton control for all machine functions.

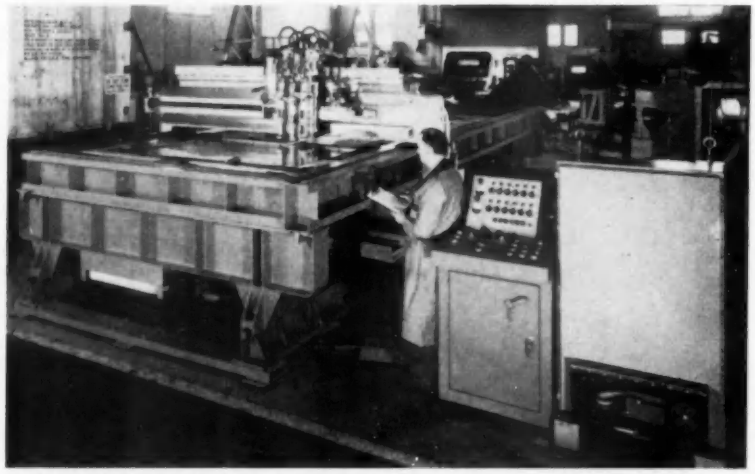
Circle 35 on postcard for more data



Michigan hard gear finishing machine cycle time is little more than one minute



Sundstrand OM5 vertical Rigidmil is designed for heavy cuts on large work pieces



McKay "2DNC McKaymatic Drill" can handle workpieces 8 ft wide by 16 ft long

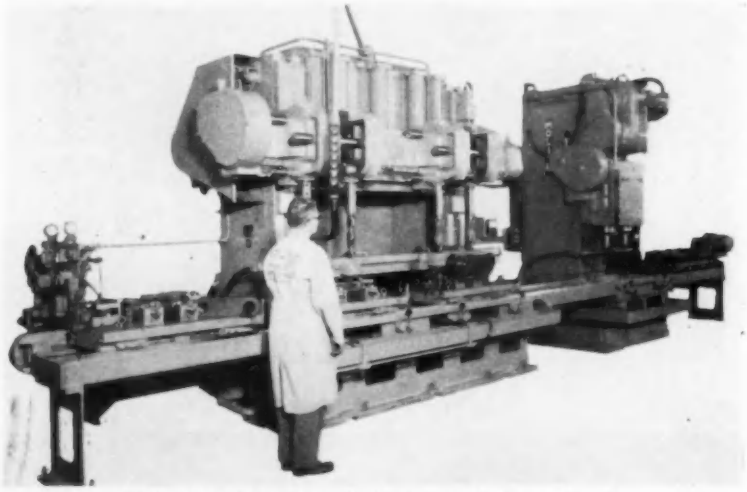
McKAY MACHINE CO.

DRILLING MACHINE — A two-dimension, point-to-point, numerically controlled drilling machine, the "2DNC McKaymatic Drill," is capable of handling workpieces 8 ft wide by 16 ft long.

Designed to eliminate templates and layout time, the machine uses a gantry type drill carriage to conserve floor space and a three-unit drill head which permits the selection of three different sizes of drills or counterboring tools.

The equipment is capable of drilling holes in 5/16 in. thick aluminum on 1 in. centers at the rate of one hole every five seconds, and will position to an accuracy of 0.005 in. in 200 in. of travel. Repeatability is held to within ±0.001 in.

Circle 36 on postcard for more data



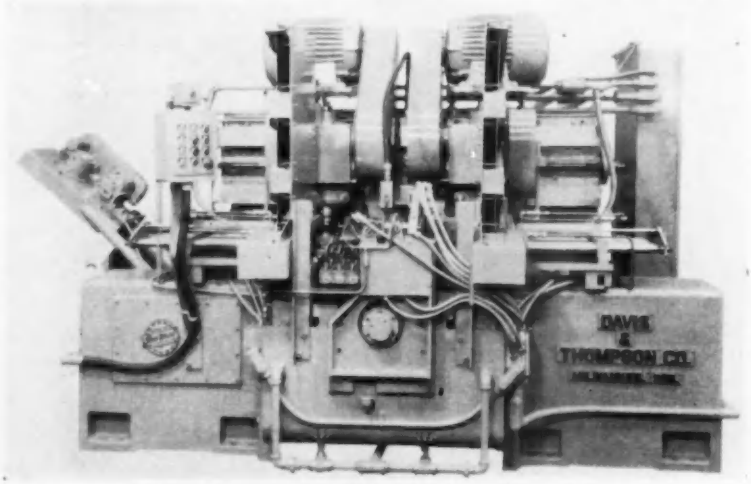
Moline three-station, two-unit drilling and boring equipment

MOLINE TOOL CO.

DRILLING AND BORING EQUIPMENT—Heavy steel links are drilled, core drilled or reamed and finish bored as they are passed along, on platen type workholding fixtures, through the three workholding stations of this combination machine.

Fixtures on the platens will handle a variety of links. The platens are moved along the transfer track by a power-operated mechanism and are positioned accurately at the working stations by locating plungers and power clamping.

Circle 37 on postcard for more data



Davis and Thompson type SMC shuttle type milling machine

DAVIS AND THOMPSON CO.

SHUTTLE TYPE MILLING MACHINE—The SMC shuttle type milling machine is designed for milling the 0.641 in. slot in steering couplings. It is provided with two six station fixtures, being right and left hand.

As the machine goes into its cycle a slide picks up six pieces from the end of the magazine on both slides and transfers them to a position opposite the fixtures. Air rams then transfer the pieces from the slide to the fixtures, where they are clamped by air. Then the screw feed table passes the parts through the cutters to the end of its stroke, where they are discharged. Production is 500 gross pieces per hour.

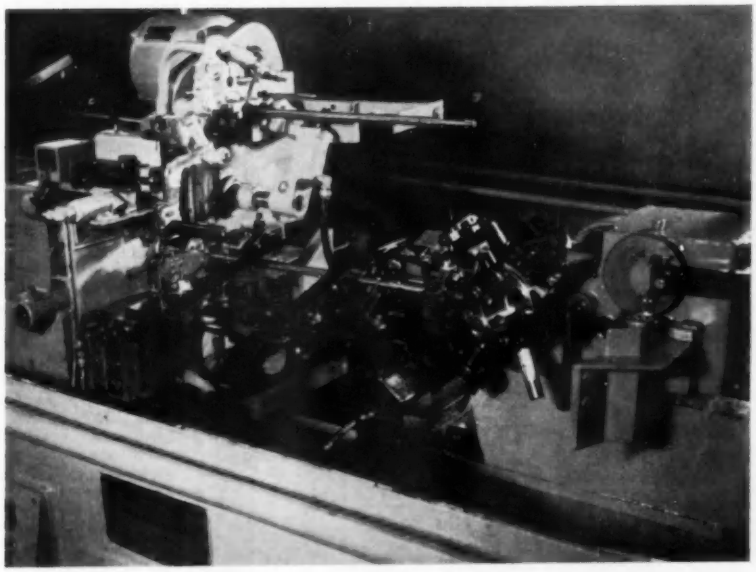
Circle 38 on postcard for more data

THE GEAR GRINDING MACHINE CO.

SCREW MACHINE — The Screwmatic 750 provides any combination of six different spindle speeds. Parts up to 7 in. can be worked at both ends simultaneously and exact spindle speeds can be selected from a highly accurate, variable-speed drive. Spindle speed controls maintain settings from no-load to full motor load.

Features of the machine include a ¾ in. diameter capacity spindle, six spindle speeds in one cycle, three forward and three reverse speeds, 7200 rpm spindle speed and spindle ratios up to 48 to 1. The machine is built on the unit construction principle.

Circle 39 on postcard for more data



Gear Grinding single spindle bar automatic screw machine of unit construction design

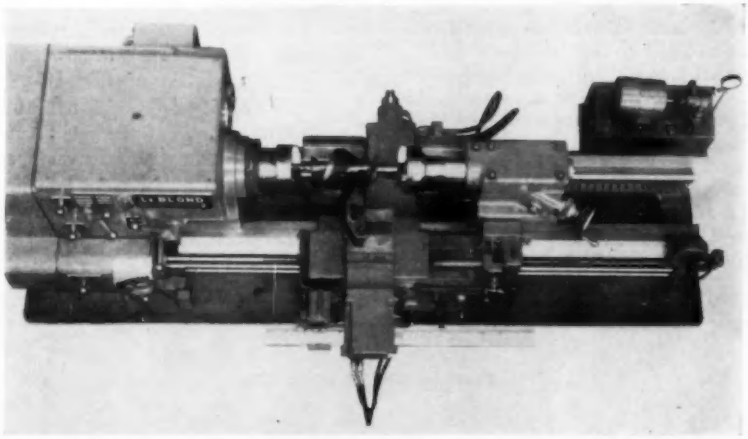
THE R. K. LE BLOND MACHINE TOOL CO.

CONTOUR CHASING LATHE — A specially designed 32 in. standard duty engine lathe automatically machines concave and convex contours on spiral shaped parts.

The outstanding feature of the unit is the unique application of a tracer unit. Instead of continuously tracing, it is used to position the tool for each successive cut. Tool cutting motion is accomplished by "chasing" the spiral, the same as chasing threads.

The carriage is synchronized with the spindle by an engagement of leadscrew and an extra-long full nut. In and out tool motion is provided by the cross slide. A tracer unit and template and a special slide mounted on the cross slide position the tool between cuts. Each feeding of the length slide moves the tracer stylus along the curved template, which positions the tool for the next cut. A special work driver and locating pin keep the workpiece from slipping while under cut, thus preventing any change due to the relationship of tool and workpiece.

Circle 40 on postcard for more data



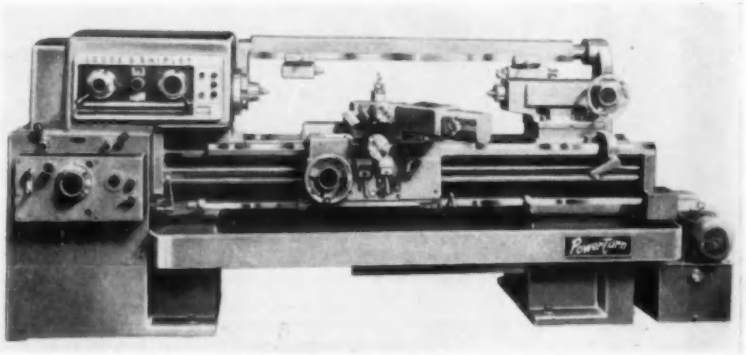
LeBlond contour chasing lathe machines concave and convex contours

LODGE & SHIPLEY CO.

TRACER LATHE — Using uninterrupted carriage feed, this tracer lathe produces a smooth finish in turning any contour involving diameters or bores connected to faces by curves.

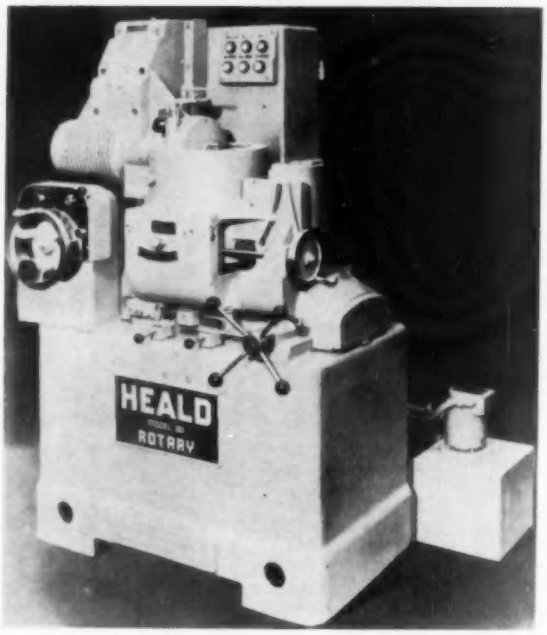
The tracing mechanism features a base mounted stylus providing a compact rugged design that simplifies loading of the lathe.

Circle 41 on postcard for more data



Lodge & Shipley 2013 Powerturn 45 degree Copymatic tracer lathe

THE HEALD MACHINE CO.



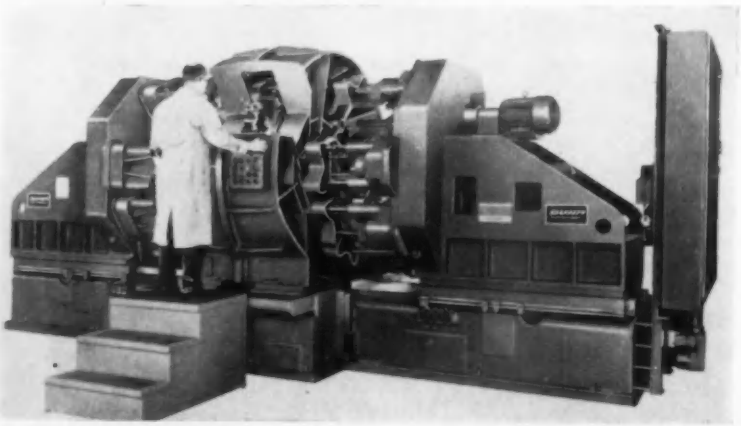
Heald rotary surface grinder has a dial type feed box that permits incremented vertical feeds of 0.0001 in. from 0 to 0.0006 in. for rough grinding, changing automatically to 0.0001 in. fine feed at any point from 0 to 0.005 in. before finish size. The machine occupies floor space of slightly over 2 by 3 ft and can be installed in a total projected floor area including door swing of less than 4 by 5 ft. Table and base ways are grease packed for life and sealed to exclude swarf and other foreign matter.

ROTARY SURFACE GRINDER—A rotary surface grinder suited to small work grinding operations grinds flat, convex or concave surfaces of work up to 6 in. OD. Designated Model 161, the column type machine can produce finishes of 2 to 4 microinches in suitable types of material in routine production. It will accommodate a wide range of relatively small work such as saw blades, slitters, gear cutters, matched angular contact bearings and similar parts.

A feature of the unit is hydraulic control of the operating cycle. Automatic table reciprocation saves operator effort and permits uniform production on relatively long runs of identical parts.

Circle 42 on postcard for more data

BUHR MACHINE TOOL CO.



SHORT RUN AUTOMATIC MACHINES—This double-end trunnion type automatic machine can be set up to produce many different parts. Coarse-feed rates are set by a selector switch and fine feed is automatically initiated at the proper point in the cycle by limit switching and valving.

Circle 43 on postcard for more data

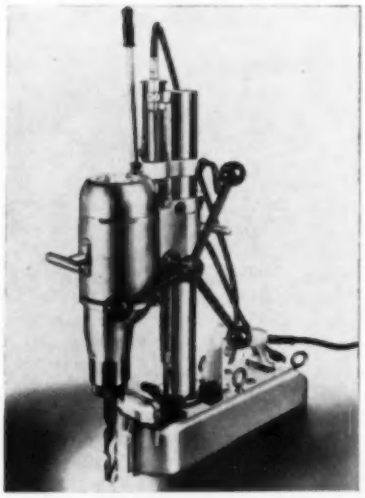
COLONIAL BROACH AND MACHINE CO.

TOOL AND CUTTER GRINDER—Heavy milling-cutter assemblies up to 1000 lb can be sharpened in arbor on a universal tool and cutter grinder. The grinder enables a plant to do its own cutter sharpening with ease and precision, reducing the need for spare cutters. Either high-speed steel or carbide-insert cutters can be ground on the machine.

The double end grinding spindle is motor driven and can be operated at a speed of 3450 or 6000 rpm. The motor is a 2 hp, 60 cycle, 440 vac. Motor controls are located on both the front and rear of the unit. The machine uses about 7 by 14 ft of floor space and weighs about 9500 lb.

Circle 44 on postcard for more data

THE BLACK & DECKER MFG. CO.



Black & Decker magnetic drill press

MAGNETIC DRILL PRESS—This magnetic drill press is tolerance-built to drill holes within 1/64 in. accuracy.

Designed for continuous operation, on either ac or dc current, the press will not overheat and thereby reduce its magnetic hold after a few hours. Among other safety and accuracy features of the press is a drill point locator for immediate, exact positioning, two-piece construction for ease of handling and remote control hydraulic power feed which enables the operator to drill while standing clear of the work.

Circle 45 on postcard for more data

UNITED TOOL CO.

TOOL FORM GRINDER—An automatic tool grinder that exactly duplicates a given form on single point brazed or solid carbide cutting tools will both rough and finish grind in the same setup, using the same grinding wheel.

The machine completes both rough and finish in one automatic cycle, requiring only the manual loading and unloading of the tools.

Named the Contour-O-Matic, it is a self-contained hydraulic machine tool having duplicate fixtures for holding the work tool and a master template or master form tool. The fixture that holds the work tool against the grinding wheel follows the movement of the master template holding fixture.

Circle 46 on postcard for more data

BURG TOOL MFG. CO.

Burgmaster floor model turrt drill

TURRET DRILL—A floor model turret drill for drilling, tapping, counterboring, reaming, or otherwise machining small holes eliminates time wasted moving the part and jig from machine to machine or spindle to spindle. Six different operations can be performed from one work location with a six station turret. The turret is power indexed, rotates itself and only the spindle in use is in operation.

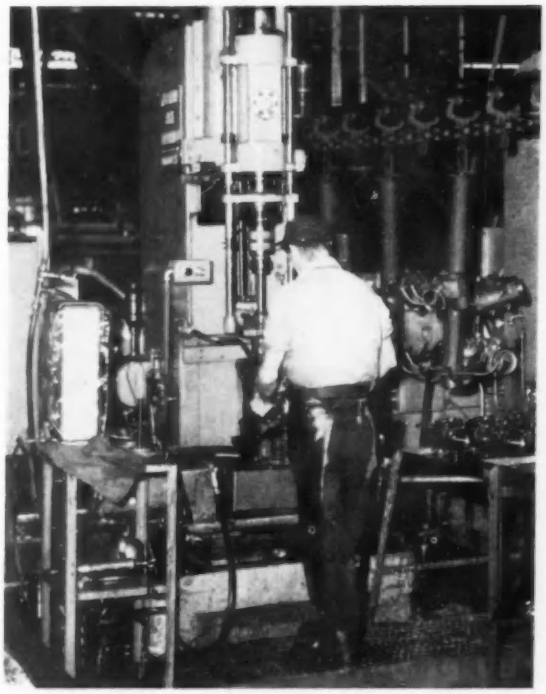
Each spindle operates at its own pre-selected speed. Range varies from 350 to 6200 rpm. Overall pedestal floor area is 18 by 24 in., height is 36 in. Floor to top of column height is 64½ in.

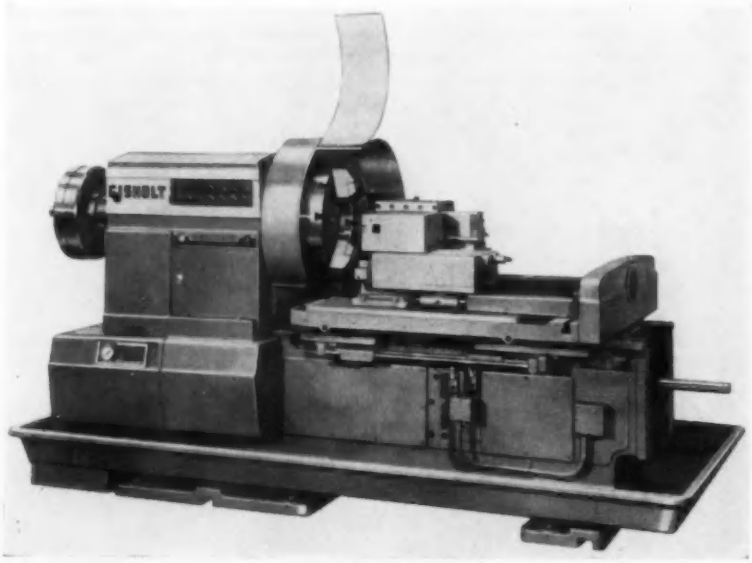
Circle 47 on postcard for more data

MICROMATIC HONE CORP.

MICROHONING UNITS—One of two Model 728 Hydrohoners shown microhoning steering gear housings. The machines are equipped with automatic stone-feed and stonewear compensating mechanisms and with automatic sizing controls. A two-position rotary index type fixture assembly is interlocked with the machine controls for full automatic index cycle

Circle 48 on postcard for more data

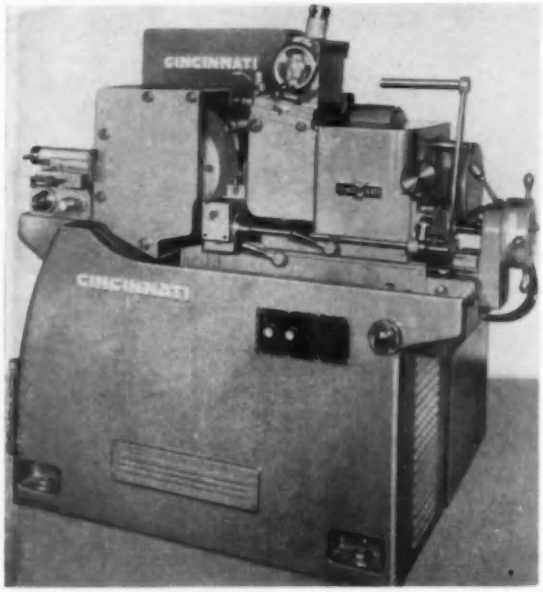




GISHOLT MACHINE CO.

AUTOMATIC LATHE—This automatic lathe uses a large table upon which tool carrying slides can be placed to best advantage. With tools mounted on independent slides, placed at the correct angle to the work, tool overhang is at a minimum for greater accuracy. The number of possible tool arrangements is infinite and permits handling a wide variety of work.

Circle 49 on postcard for more data



CINCINNATI GRINDERS, INC.

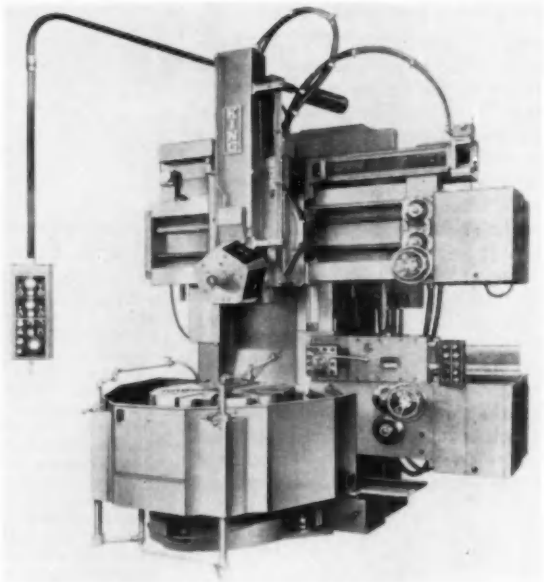
Cincinnati centerless grinder No. 1 has its controls contained in a cabinet with the exception of the regulating wheel drive motor; wiring conforms to JIC electrical standards. Attachments and accessories include infeed and thrufeed work rests and blades; two types of automatic infeed attachments; crush trying; profile truing; grinding wheel positioning and others.

CENTERLESS GRINDING UNIT—No. 1 centerless grinding machine, with a 7½ hp rating for the grinding wheel spindle, has a capacity for 0 to 1½ in. diameter work.

Features include Filmatic bearings for the grinding wheel spindle which consist of three segments and automatically adjust for load and eliminate spindle flutter. The spindle is supported in a fixed mounting in the bed casting. A double slide and swivel plate construction between the regulating wheel housing and bed simplifies setups.

Regulating wheel speeds are infinitely variable. A wide V-belt running between two pairs of sheaves provides the method for changing speeds. An individual ½ hp motor supplies the power, and a built-in tachometer indicates the spindle speed.

Circle 50 on postcard for more data



AMERICAN STEEL FOUNDRIES

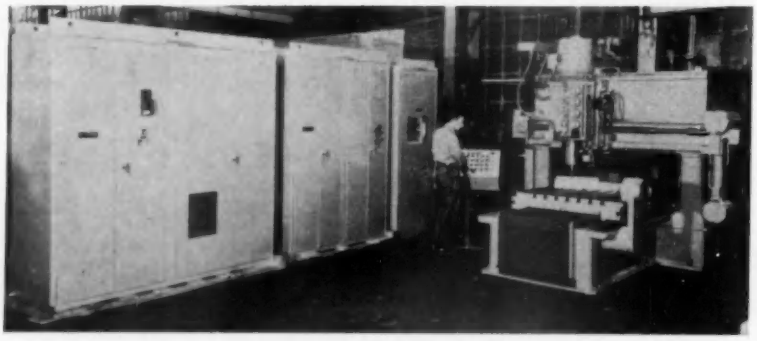
King boring mill with automatic feed—stops offers optional equipment such as automatic tracing of heads, automatic cycling, power indexing of turrets, constant surface cutting.

BORING MILL—Optional features available on the new-design King vertical boring and turning machine include automatic stops, automatic tracing control of heads, automatic cycling, power indexing of turrets and constant surface cutting. One vertical and one horizontal adjustable stop is provided for each of the five turret faces for standard five-position turret heads.

Circle 51 on postcard for more data

MOREY MACHINERY CO., INC.

PROFILE, CONTOUR MILLING UNIT — This numerically controlled profile and contour milling machine was developed for automatic small-quantity production. Its three-motion magnetic tape control system, designed by General Electric Co., directs vertical, transverse and longitudinal milling at rates up to 100 ipm and at tolerances to ± 0.001 in.

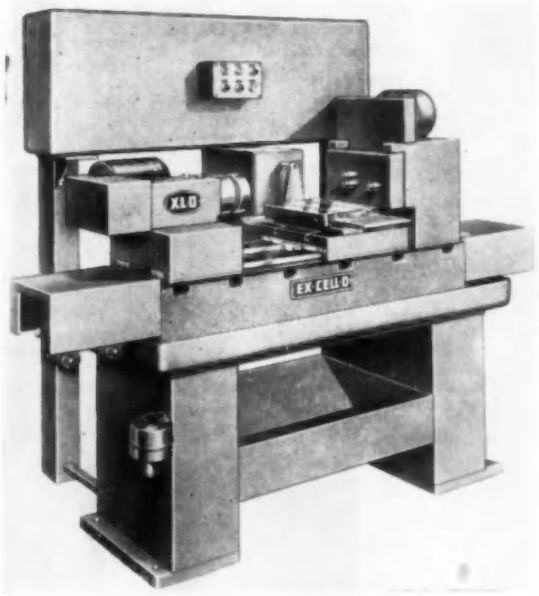


Morey Model A50 profile, contour milling machine with numerical control

Rigidity of the machine is demonstrated by the fact that a finish of 40-50 RMS is obtained on a roughing cut. The unit is provided with speeds and feeds to machine any material from tough-alloy steel to non-ferrous metals.

Since feed motion of all three axes is numerically controlled from magnetic tape, the cutter can be positioned or directed along a continuous path for various types of contouring operations and parts may have regular or irregular shapes, straight lines, angles or circles.

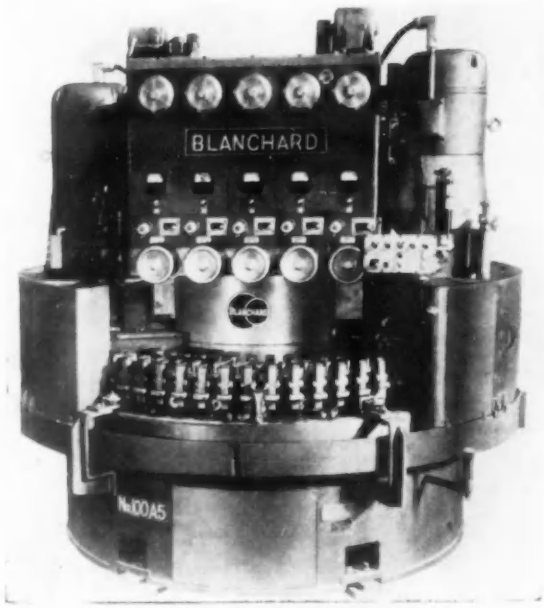
Circle 52 on postcard for more data



EX-CELL-O CORP.

PRECISION BORING MACHINES—Two precision boring machines designated as Styles 711 and 712, have been developed primarily for the instrument and missile industries but are adaptable for many situations requiring very small and accurate bores. The Style 712, shown equipped with the new multi-spindle head at one end and a standard single spindle at the other is capable of machining many small gear cases and similar components requiring accurate holes held to close center distances in one pass.

Circle 53 on postcard for more data



THE BLANCHARD MACHINE CO.

AUTOMATIC GRINDER—Shown is the front view of the Blanchard 100A5 center column automatic surface grinder—a five spindle unit for high-production work on various parts. The fixture on this unit is for grinding the sides of connecting rods.

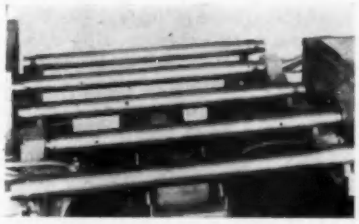
Circle 54 on postcard for more data

VULCAN TUBE CO.

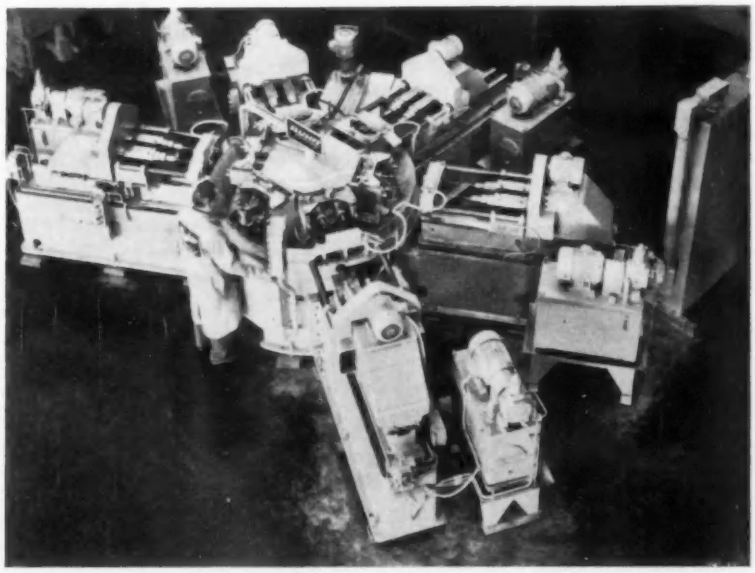
TUBE TRIMMING MACHINE—This tube trimming machine is capable of trimming tubing 24 to 72 in. long. It is completely automatic in that it picks up the tubes from an idle station outside the machine, carries them through, trims both ends and then deposits them in an idle station outside the machine. Wall thickness can vary from 0.093 down.

Straight, bulged or reduced tubing can be trimmed and held to tolerances of ±0.005. Tubes are trimmed from the inside out and are free of burrs. Tubing is full metal thickness at the trimmed edge and there are no steps or tube distortion. Both ends are trimmed by means of Brehm "Shimmy" dies hydraulically operated and horizontally mounted. Tubes are inserted by hydraulic cylinders and withdrawn by electro-magnets.

Circle 55 on postcard for more data



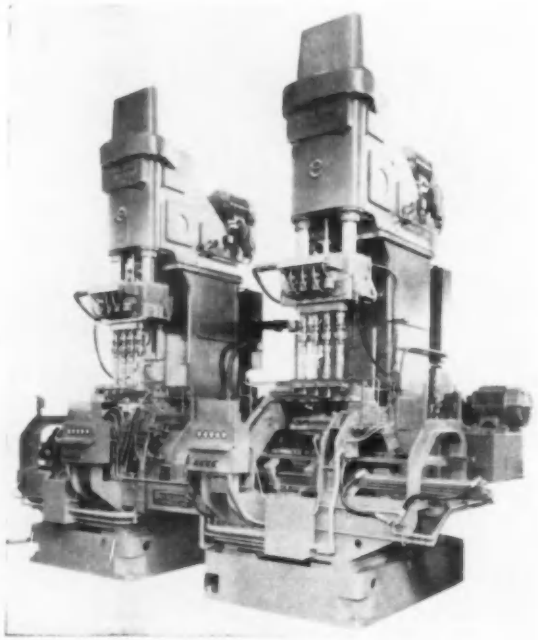
Vulcan tube trimming machine



BUHR MACHINE TOOL CO.

SPECIAL MACHINE—Holes, 1/4 in. in diameter by 7 3/4 in. deep are drilled with minmium drill breakage on this Buhr Economatic machine. Proximity switches at the end of the slender drills shut down the machine if a drill should break. Breakage is minimized because the machine makes five passes to complete the holes.

Circle 56 on postcard for more data



BARNES DRILL CO.

Barnesdril Model 320 standard vertical type honing machines equipped with automatic bor sizing, 20 in. hydraulic spindle stroke and one 4-spindle auxiliary head each.

VERTICAL TYPE HONING MACHINES—The bores of two different cast iron V-8 cylinder blocks are honed on these standard type honing machines. Bore sizes are 3.625 ID by 5-11/16 in. long and 3.875 ID by 6-¼ in. long in respective parts; both semi-blind end bores. The complete machine is fully automatic and equipped with electrical interlocks and probe for maximum safety.

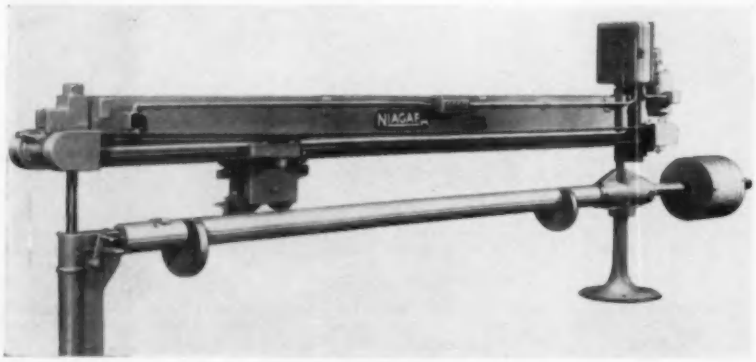
Circle 57 on postcard for more data

NIAGARA MACHINE & TOOL WORKS

POWER GROOVER—Powered by a direct-connected reversible gearhead motor, a new power groover features centrally-located pushbutton controls. A built-in brake is provided to stop the carriage for rapid return stroke. Driven by a pair of endless chains, the carriage is returned to starting position automatically by means of a limit switch which reverses the drive. A built-in zero speed switch protects the motor and gears from overload by preventing reversal when the carriage is in motion.

Eight models are available for single or Pittsburgh lock seaming. The groovers can be obtained with working lengths from 4 to 10 ft for handling mild steel up to 16 gage.

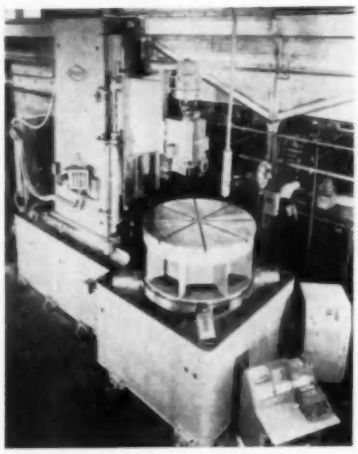
Circle 58 on postcard for more data



Niagara power groover is obtainable with working lengths from 4 to 10 ft

BAKER BROTHERS, INC.

DRILL PRESS—Built for a jet engine maker, a new vertical hydraulic-feed, single-spindle drill press with a horizontal index table drills holes on circle diam from 0 to 60 in. Bolt circle spacing is variable and the control is manual or fully automatic.



Baker electronic drill press

Total travel of the spindle is 30 in., cycle is rapid advance feed and rapid return. Spindle speed is variable between 60 and 3000 rpm. The spindle develops 2 hp at 60 rpm and approximately 3 hp at 3000 rpm. The index table is electronically controlled. Automatic operation of the index table is through a standard IBM punch card system.

Circle 59 on postcard for more data

ABRASIVE MACHINE TOOL CO.

PRECISION SURFACE GRINDER—Flats, slots, shoulders and shapes can be ground automatically to close tolerances on hydraulic powered Hydrabrasive precision surface grinders. By setting the automatic down feed to actuate either on the table reversal or saddle reversal, the equipment will operate to preset tolerances. Depending upon the finish required, the unit can be set for either 1, 2 or 3 spark-out passes before automatically shutting off.

The down feed is set from 0.0001 to 0.0025 in. on the elevating handwheel. This adjustment can be varied while the machine is running.

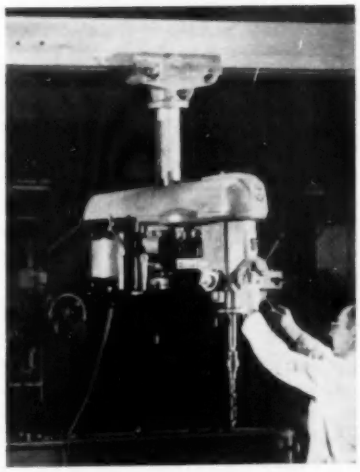
Circle 60 on postcard for more data

THE CROSS CO.

DIAL TYPE MACHINES—Two new dial type machines can process automobile valve rocker arms at the rate of 800 per hour. One machine drills and reams the rocker shaft hole, forms the oil grove and drills one oil hole. The other machine drills, chamfers and taps the adjusting screw hole; and drills, counter-drills and spotfaces a second oil hole. Both machines have six stations. Pushbutton-controlled power winches operate the fixture clamps. All standard and special parts of the two machines are completely interchangeable.

Circle 61 on postcard for more data

ROCKWELL MFG. CO.



DRILL HEAD — This accessory permits mounting a 20 in. drill head on an overhead track. The set-up is useful in drilling panels, sheets, plates or large work or in any other application where the work is difficult to move or where it is easier to drill a number of holes without moving the work.

Circle 62 on postcard for more data

WIEDEMANN MACHINE CO.

TEMPLATE MACHINE—Holes can be drilled in template to within 0.002 in. with a new coordinator machine which is also applicable for producing drill jigs, simple fixtures and other precision work in flat sheet metal or plate. In operation, material is placed against an end stop and secured to a cross slide by work positioning clamps. Using a simple X and Y chart for hole locations, the operator sets the dimensions with two optical scanners in conjunction with fixed scales. As soon as location is made, the hole is drilled from the bottom through a carbide drill bushing.

Circle 63 on postcard for more data

MODERN INDUSTRIAL ENGINEERING CO.

Model BM1-15M — Modern deburring and chamfering machine is equipped with a built-in chip disposal unit. Automatic indexing of the part from slot to slot takes place during the return stroke of the tools.

DEBURRING, CHAMFERING UNIT — Functional chamfering of slots can be accomplished with a new machine, Model BMI-15M. The single-station deburring and chamfering unit will deburr and chamfer slots at the rate of over 200 parts an hour.

Parts are manually loaded in the work station and a radial locater is actuated by the operator to assure positive part-positioning. The quill then comes down and the part is automatically air-chucked clamped. The parts locater is then retracted and the cutting cycle is started by the operator pushing two pushbuttons. Cutting is dry, coolant is unnecessary.

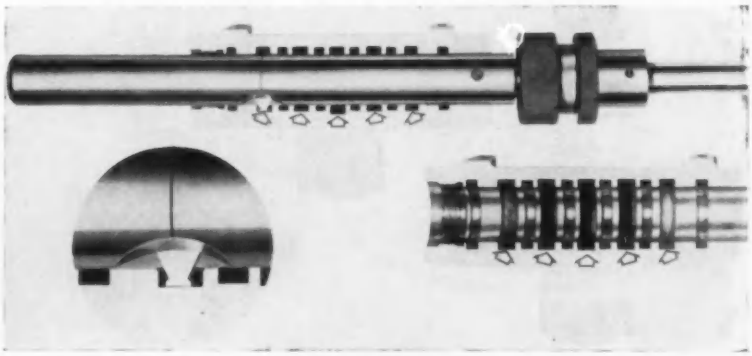
Circle 64 on postcard for more data

NOBUR MFG. CO.

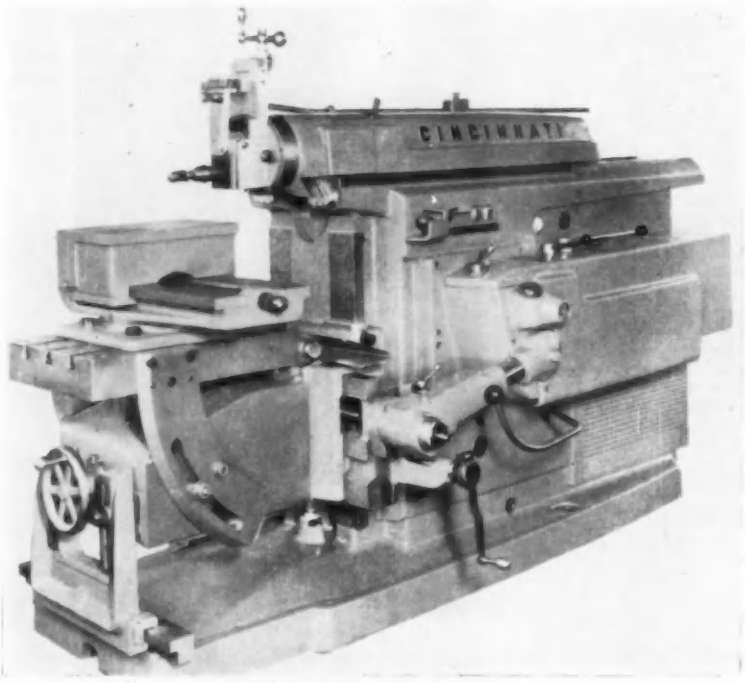
CUTTING TOOL—The standard Nobur HA tool can be applied to applications such as the controlled deburring and chamfering of internal annular grooves about a central bore of not less than 3/16 in. in diameter.

The tool features an angulated cutter which can be mechanically projected from and retracted into a long cylindrical pilot. It is securely locked when in a projected position. For application to an internal groove, the cutting blade is formed with an integral non-cutting guide extending beyond the cutting surface. This is ground narrower than the groove, so that the guide will enter the groove followed by the cutter which imparts its form to the work.

Circle 65 on postcard for more data



Nobur standard HA tool for deburring and chamfering internal annular grooves



THE CINCINNATI SHAPER CO.

SHAPER—Pictured is a Cincinnati rigid shaper. The table may be tilted up or down, and is easily relocated in a true horizontal position by means of a removable locking dowel. The vise has 5 by 15 in. long jaws. Horizontal and vertical power rapid traverse are provided to shorten set up time.

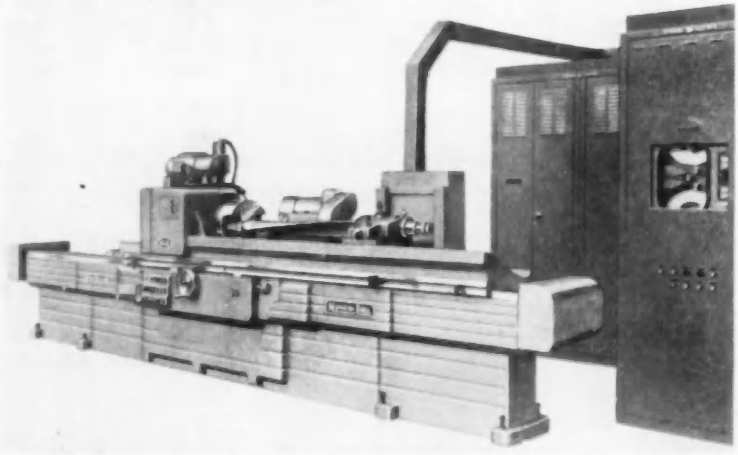
Circle 66 on postcard for more data

EX-CELL-O CORP.

PROFILING MACHINE — The Numeri-Trol machine permits a part, mounted between centers or chucked, to be machined complete in three dimensions in one setting. The principle of operation is that a cutter generates the radial contour and feeds for the length of the part, while the latter may be either continuously rotated or indexed for each cut.

The machines are equipped for rotary or longitudinal milling and for finish grinding a variety of work having complex forms, maximum capacity being 60 in. long by 11 in. wide.

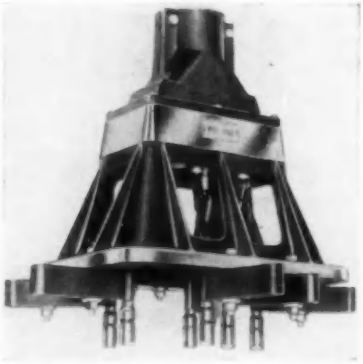
Circle 67 on postcard for more data



Ex-Cell-O Numeri-Trol profiling machines for rotary or longitudinal milling

COMMANDER MFG. CO.

MULTI-DRILL—Model "8-12" Multi-Drills may be equipped with up to 15 gear-driven spindles for multiple drilling and tapping over a maximum area of 25½ by 21½ in. Universally adjustable locating arms and heavy-duty universal joints used in all spindles permit any desired hole pattern adjustments within the working area of the unit. It will fit any drill press.



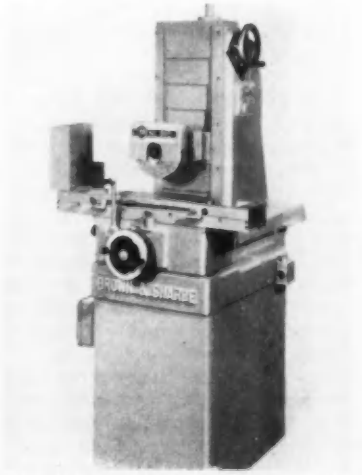
Commander Model "8-12" 15 spindle multi-drill

Circle 68 on postcard for more data

BROWN & SHARPE MFG. CO.

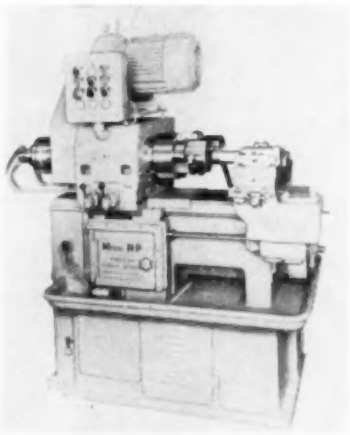
SURFACE GRINDING MACHINE—The No. 510 surface grinding machine grinds work to 11 in. long, 5¼ in. wide and 12¼ in. high with an 8 in. diameter wheel. The spindle is the removable unit type. The table glides on ground and precision lapped rollers traversed by a hand-operated lever.

Circle 69 on postcard for more data



Brown & Sharpe No. 510 grinding machine

SENECA FALLS MACHINE CO.



Seneca Falls boring machine

BORING MACHINE—Precision boring machine, Model NP, is available with either one or more precision spindles mounted independently on a fixed bridge. The spindles may be driven by separate balanced motors when different spindle speeds are required, or by a single motor with tandem drive.

Longitudinal movements are obtained by a drum can which assures positive feed.

Circle 70 on postcard for more data

NATIONAL AUTOMATIC TOOL CO., INC.

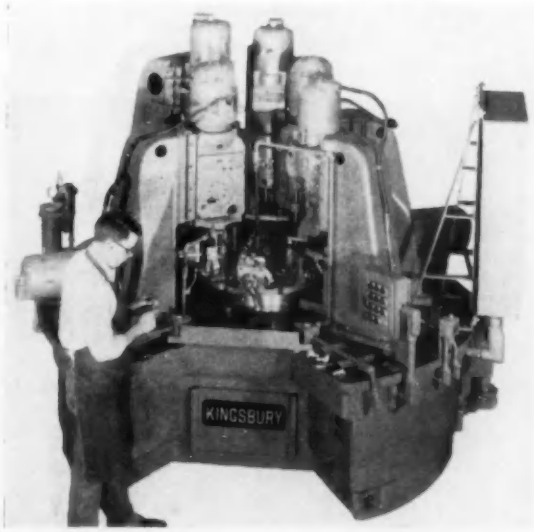
MULTIPLE SPINDLE MACHINE—This multiple spindle machine drills and taps simultaneously and achieves a production rate of 400 parts per hour. It is available with 16 or 24 spindles. Half of the spindles, located on one side of the head, are used for drilling, and are driven by a standard electric motor. Those on the other side are driven by a high-reversal-duty hydraulic tapping motor. Loading is accomplished during machine operations, and unloading is automatic as parts drop down a chute. A rotating table can be used to maintain high production rates where operations are such that additional locating or clamping means are necessary.

Circle 72 on postcard for more data

KINGSBURY MACHINE TOOL CORP.

MULTI-UNIT AUTOMATIC—This multi-unit automatic is for die castings for automatic transmissions. Eight units with 11 spindles drill, hollow mill face, chamfer, ream and trepan at a gross production rate of 240 per hour. A 26-inch index table holds six work fixtures with manual clamping and automatic unclamping.

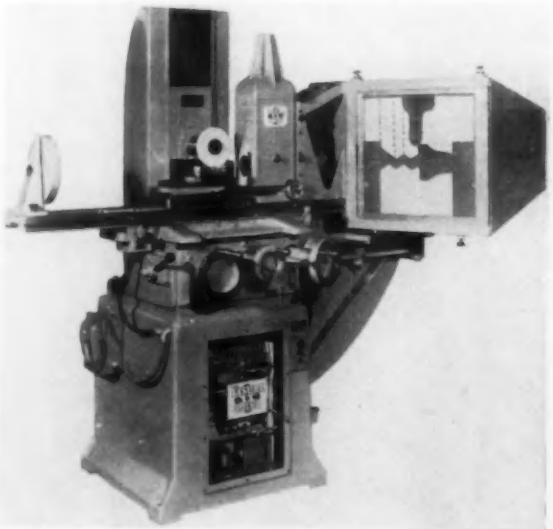
Circle 71 on postcard for more data



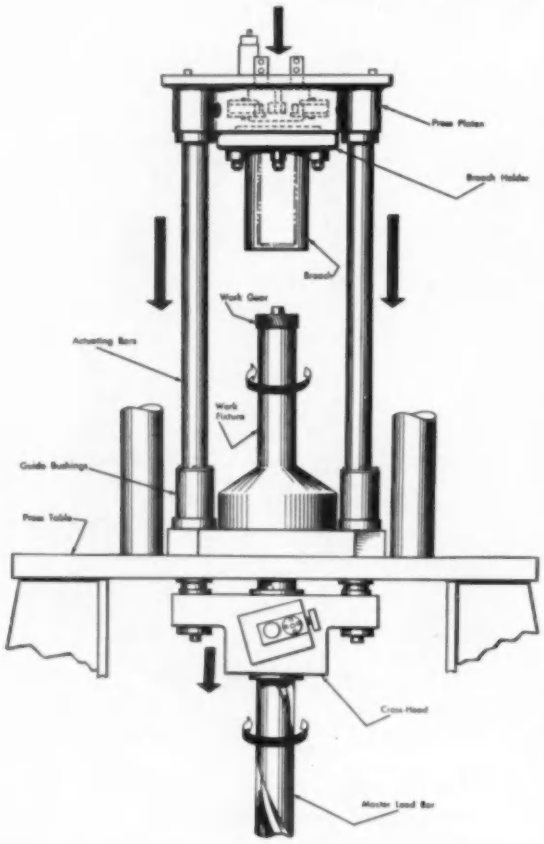
CLEVELAND GRINDING MACHINE CO.

PROJECTION GRINDER—Continuous lubrication, a timer belt, 110 v electrical control and close tolerance downfeed are among the features on the VG-3 Visual Grind optical projection grinder. The unit enables the form grinding of steel and tungsten carbide to precision tolerances. This is accomplished by projecting the workpiece on a ground-glass viewing screen with magnification systems ranging from 10:1 to 100:1. The workpiece is ground and inspected on the screen enlargement.

Circle 73 on postcard for more data

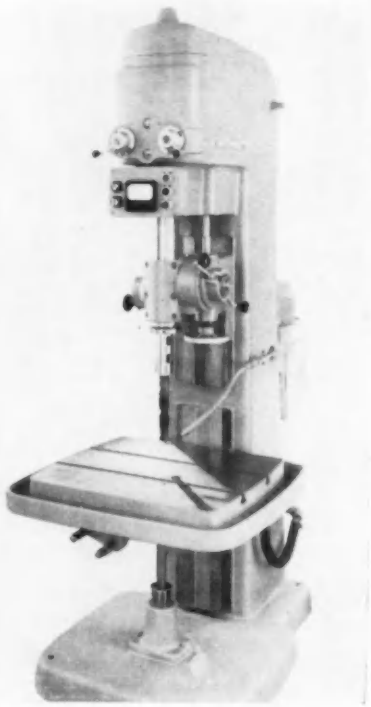


NATIONAL BROACH & MACHINE CO.



BROACHING PROCESS — This Red Wing broaching process produces external helical gears. In its initial application it produced an 87 tooth, 24 pitch, 22 degree helix angle 4 in. OD cast iron helical gear having a ¾ in. face width in a five second cutting cycle. The use of a solid high-speed steel hollow broach in which many broach teeth are ground from the solid is the main feature of the machine. The process can be applied on a conventional vertical hydraulic press. A check of ten gears made by the broach showed maximum tooth pin size variations of 0.0009 in. a maximum variation in lead on both sides of teeth of 0.0008 in. and maximum involute variation of 0.0003 in.. it was reported. Finish broached gears are raised by the broach to the top of the stroke and ejected automatically by an air cylinder arrangement into the chute at the front of the broach head.

Circle 74 on postcard for more data



CINCINNATI LATHE AND TOOL CO.

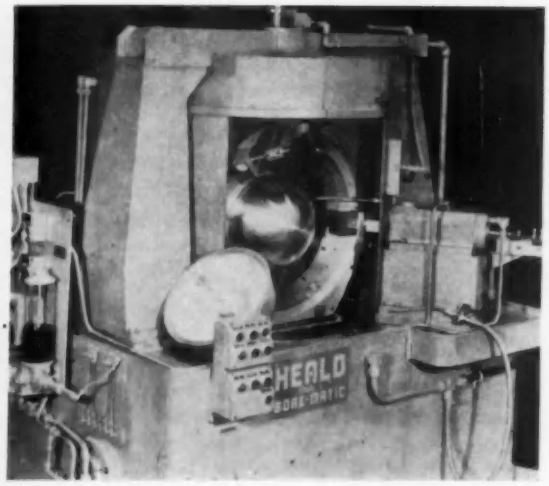
Infispeed medium duty drills afford a spindle speed range from 450 to 3000 rpm with the standard 1800 rpm 1 hp motor. The heavy duty drills provide 60 to 1825 rpm spindle speeds with the standard 1800 rpm 3 hp motor. Power feed with five feed rates from 0.002 to 0.015 in. is standard equipment on the heavy duty drills.

Circle 76 on postcard for more data

HEALD MACHINE CO.

BORING MACHINE— Heald Model S Bore-Matic simultaneously bores and turns the ID and OD of aluminum hemispheres. Uniform concentricity between inner and outer surfaces is maintained, and because the inner and outer tool pressures equalize each other, a heavy cut can be taken without distorting the shape of the thin walled part.

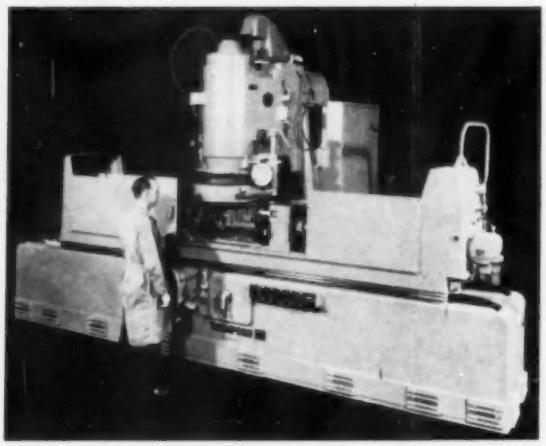
Circle 75 on postcard for more data

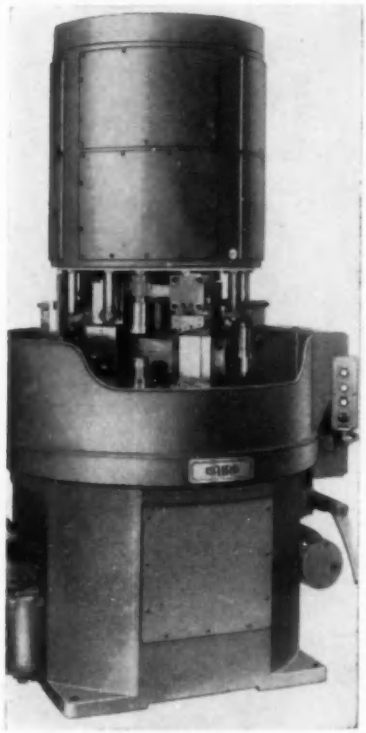


THE THOMPSON GRINDER CO.

VERTICAL SPINDLE SURFACE GRINDER— This vertical spindle surface grinding machine is shown grinding Diesel engine cylinder blocks. Its production rate for this operation is 30 blocks per hour with a total stock removal of 0.10 in. The machine features automatic grinding and fixturing cycles.

Circle 77 on postcard for more data





THE BAIRD MACHINE CO.

VERTICAL LATHE—

Baird eight inch 4 spindle vertical continuous lathe. Full safety interlock is provided in the dead sector for manual load and unload. Automatic load and unload can be included. It is designed and built to American machine tool standards and to maintain close tolerances in production line operations. Each spindle has precision automatic work-holding with two vertical and one cross slide tool motions in any required combination.

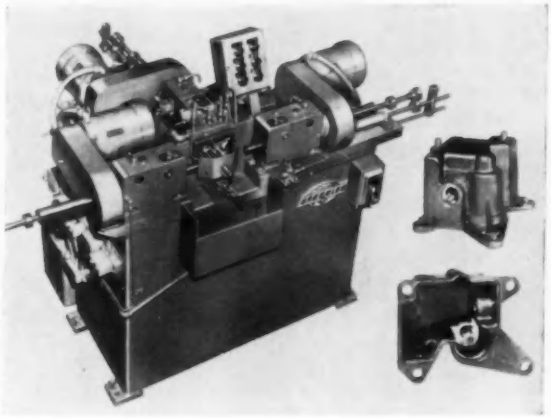
Circle 78 on postcard for more data

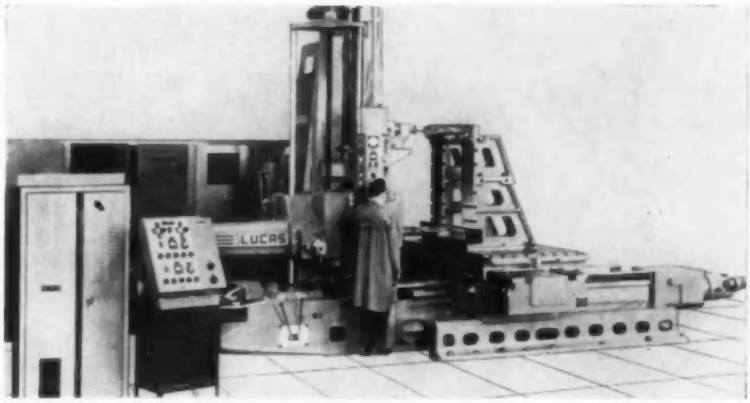
GREENLEE BROS. & CO.

PRECISION BORING MACHINE—

Greenlee Bros. three-station precision boring machine for machining aluminum die castings consists of three standard Greenlee Model S-6 Hydro-Borers mounted on a welded steel base

Circle 80 on postcard for more data





NEW BRITAIN MACHINE CO.

BORING, DRILLING, MILLING MACHINES—A complete line of table-type and floor-type horizontal boring, drilling and milling machines is equipped with General Electric program controls. Machines can be furnished with tracer equipment, numerical positioning equipment (punched tape) or numerical contouring equipment (magnetic tape).

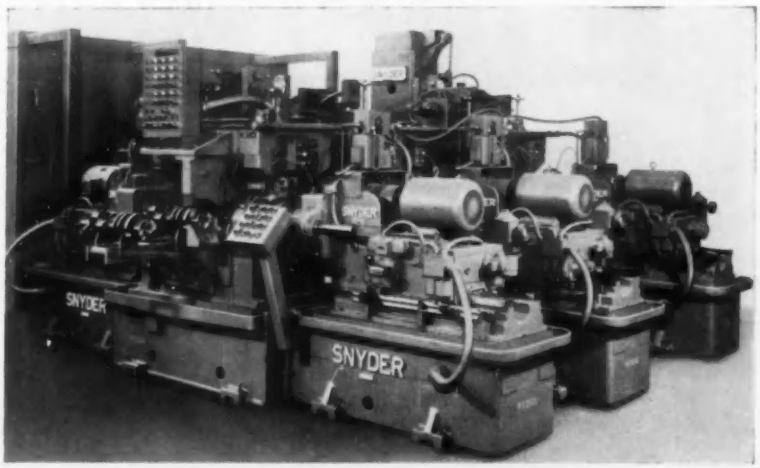
Circle 81 on postcard for more data

SNYDER TOOL & ENGINEERING CO.

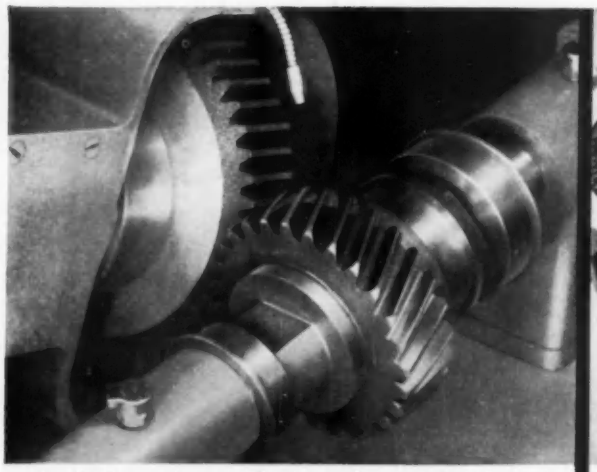
TRANSFER MACHINE—A ten-station, segmented special transfer machine will drill, spotface, ream, tap and mill a key-way in automotive engine crankshafts at a net production rate of 64 pieces per hour. Tapped holes in the parts are blown out in process and inspected automatically by probe-type gaging fingers to check for through-drilling. The tapped holes are also blown out automatically after tapping.

The machine is made up of three segmented machining units connected by a transfer mechanism. This design is said to provide for easy tooling accessibility and to simplify problems of alteration for future design changes. Automatic lubrication systems are provided throughout

Circle 79 on postcard for more data



Snyder 10-station segmented special transfer machine made up of three connected units

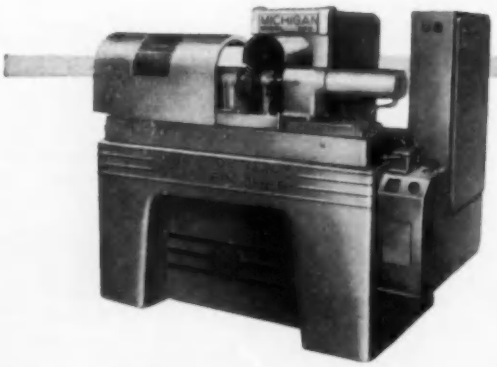


The finishing action—an abrasive tool rotates in tight mesh (and drives) the hardened work gear in a crossed-axes relationship. The table traverses the work the full face width.

Grit content of the abrasive-plastic tool varies with application. Relatively inexpensive, the throwaway tools actually become even more accurate as they "wear in".

Announcing HARD GEAR FINISHING...

. . . new process removes nicks and surface imperfections after heat treating to give you quiet, smooth-running gears. Uses long-life throwaway tools to slash rejections



Abrasive Hard Gear Finisher (Model 999), a compact, functionally styled machine cleans up and silences hard gears in about one minute. With horizontal axes, the finisher is easily tooled for semi- or full-automatic operation. An integrated gear speeder and/or crowning attachment are optionally available with the machine.

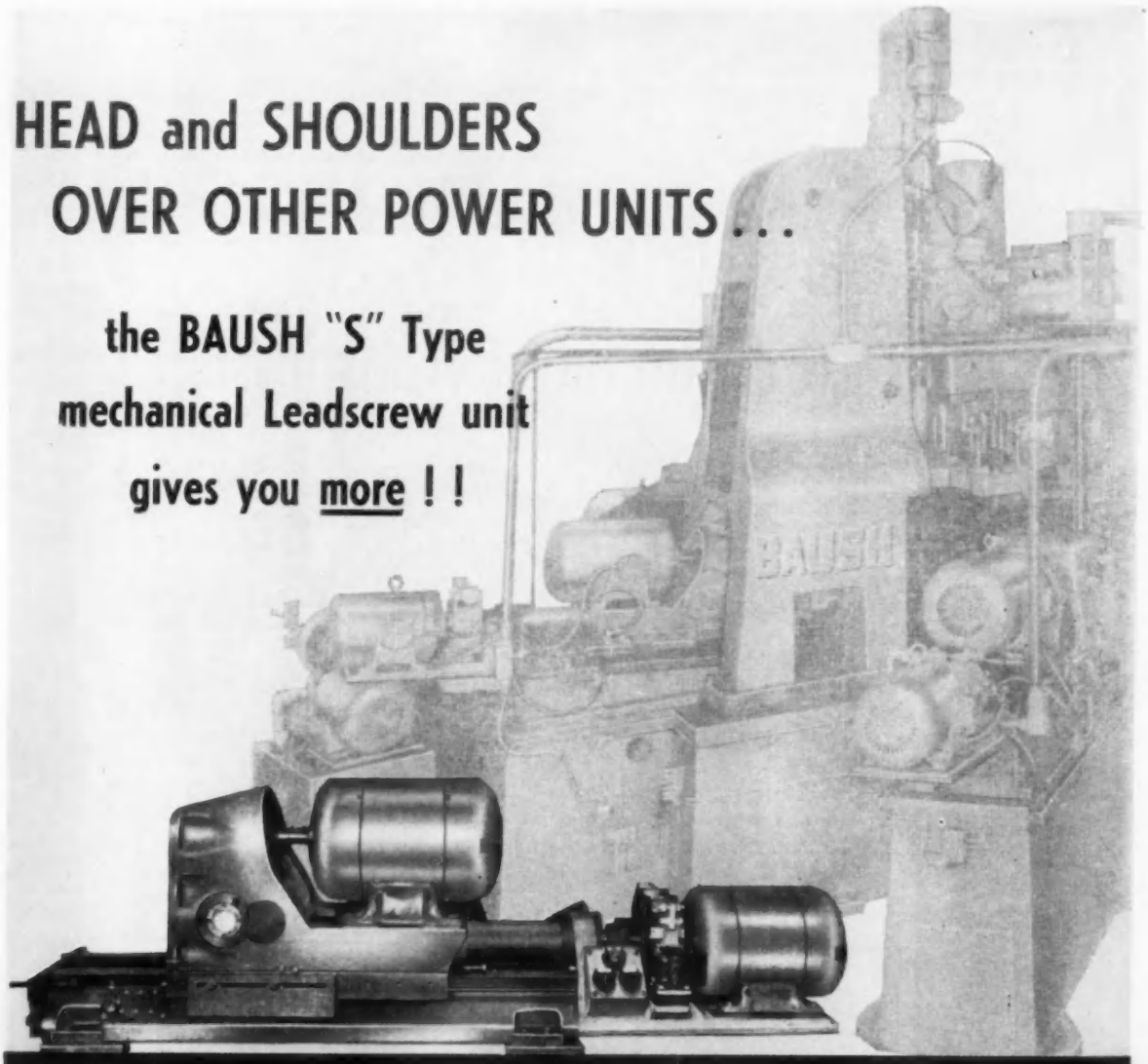
Now you can obtain consistent quietness and smoothness on your hardened small- and medium-sized gears (up to 12-inches diameter). Michigan Tool's Abrasive Hard-Gear Finisher does the job quickly and effectively at low cost. It uses amazingly long-life abrasive-impregnated tools to remove nicks and burrs, improves finish, and tightens dimensional accuracy by further refinement after heat treat. It all adds up to quiet, lower cost gears. Full details in Bulletin 999. Write for it.

MICHIGAN TOOL Company

7171 E. McNICHOLS RD., DETROIT 12, MICH., U.S.A.
IN CANADA: COLONIAL TOOL CO. LTD.

HEAD and SHOULDERS OVER OTHER POWER UNITS...

the BAUSH "S" Type mechanical Leadscrew unit gives you more ! !



OTHER MONEY SAVING FEATURES

- Less down time — with easy economical maintenance by shop mechanics
- Longer life of motors, gears, spindles, and guide bushings
- Positive, steady tool feed
- No surge or tool breakage in break-thru
- Interchangeability of units
- No costly hydraulic fluids
- No time-killing hydraulic leaks
- Operator starts work immediately — no waiting for warm-ups

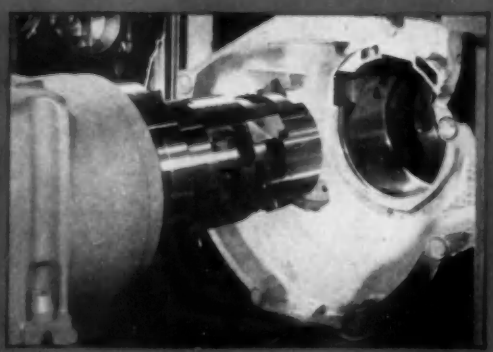
BAUSH
MACHINE TOOL CO.
SPRINGFIELD 7, MASSACHUSETTS

Cincinnati 26-Station

Mills, Drills, Bores . . .
Ford Automatic Transmission Cases

Transmission cases require gentle handling; firm, balanced clamping; experienced machining. All these requirements are incorporated in the CINCINNATI 26-Station Unit Type Transfer Machine illustrated at the right. This production line mills, drills and bores Ford automatic transmission cases; inserts two bushings; automatically banks excess parts; transfers the casting from one station to the next. There are 26 stations, allocated as follows: 10 for machining, one for inserting bushings, one for banking, one for future engineering changes, and the remainder for other functions required in a modern transfer line. Several outstanding advantages are incorporated in this line, including unit construction and complete static electrical control. ¶Cincinnati builds special machine tools and complete production lines varying in complexity from small bearing-shell broaching machines to giant production lines performing a multitude of operations. Make Cincinnati your first choice for equipment of this type. The Special Machine Tool Division is ready to serve you.

Rough milling the pan face, station 2. This is the first machining operation on the transmission line.



Boring and chamfering the large diameter. At the same time, boring and facing operations are performed from the other end. Station 8.

CINCINNATI®

Special Machine Tools · Vertical and Horizontal

Unit Type Transfer Line

Inside the transmission case. Hard-to-reach surfaces are easily machined on the CINCINNATI Transfer Line.

At Ford Motor Company's new plant in Sharonville, Ohio, automatic transmission cases are automatically bored, milled and drilled in 33 machining operations on this CINCINNATI 26-Station Transfer Line. Accuracy and finish are excellent. The machine cycles 137 times per hour.

CINCINNATI

Broaching Machines · Complete Production Lines

Special Machine Tool Division
THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

BENDING
STAMPING
ROLLING
FORGING
SHEARING

Forming Equipment Section

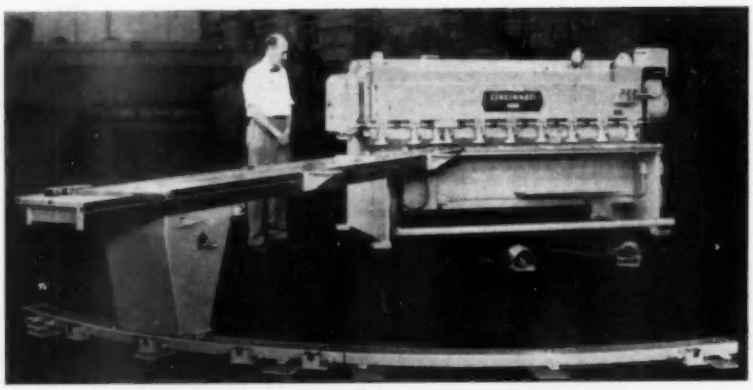
FOR ADDITIONAL INFORMATION, please use reply card on PAGE 139

CINCINNATI SHAPER CO.

SHEAR—Development of a shear machine equipped with a special, pivoted, angular shearing gage makes steel sheet shearing at any one of a number of different design angles possible. Total angular tolerance is within two minutes.

The pivot point for the gage is in the shear table. Traveling on a floor-mounted track is the gage support carriage. All gage stops are equipped with micrometer adjustments, which provide accuracy in gaging the length of the sheared pieces. Work is clamped by hydraulic holddowns which exert five tons of pressure. Operating speed is 65 spm.

Circle 82 on postcard for more data



Cincinnati 10 Series by eight-foot shear machine operates within angular tolerances of two minutes by use of an angular shearing gage incorporated in the unit

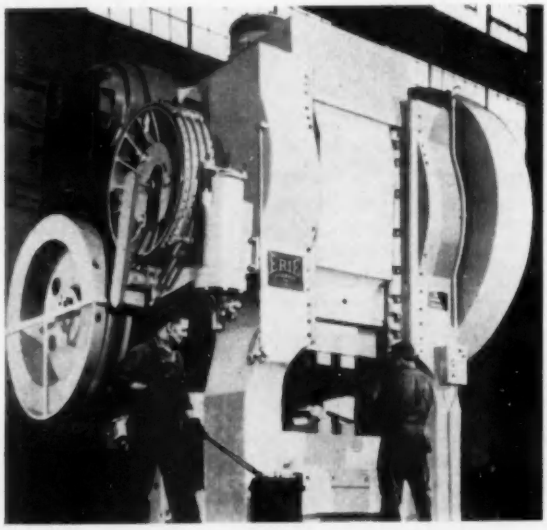
ERIE FOUNDRY CO.

FORGING PRESS—A 2500-ton mechanical forging press is designed to provide greater clearance for manipulating the work in and out of the die. This was accomplished by spreading the front columns and moving the working area forward.

Overall press height is 11 ft, 3 in. A scotch yoke or sliding block is used to transmit pressure from the eccentric shaft to the ram. This device also provides a large bearing area, increases the rigidity of the press, and eliminates the need for the pitman and ram pin. Circulating flood lubrication is provided for the main bearings, and the sliding block is operated in an oil bath. Herringbone type gears of alloy steel are used.

Circle 83 on postcard for more data

Erie Foundry Co. has mounted the air-operated, two-plate clutch on the main shaft within the main gear, on this 2500-ton mechanical forging press. Bearings are mounted behind the clutch plate. The cover, piston and springs can be removed as a unit making inspection of the clutch lining a simple operation.

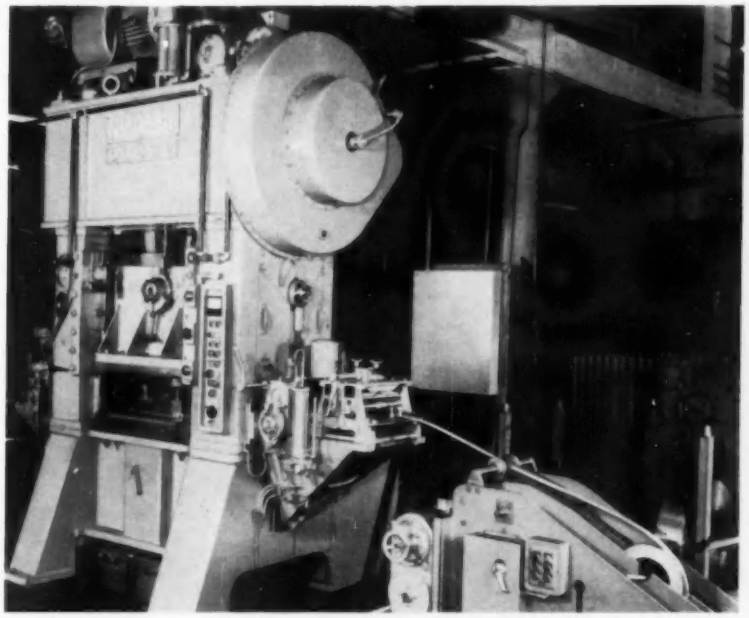


NIAGARA MACHINE & TOOL WORKS

AUTOMATIC-FEED PRESSES—Equipped with automatic coil feed and press-mounted controls and devices, a line of presses performs blanking, forming, drawing and perforating operations in long or short runs. Known as the series SA-2 Automatic, these two-point straight-side all-steel presses are of heavy, vibration-free construction.

The automatic feed permits coil stock to be fed at speeds up to 100 fpm. A patented roll-lifting system is built into the press for independent adjustment of ingoing-outgoing rolls from floor level. Built with shaft diameters from 4½ to 9 in., the presses are available in capacities from 60 to 200 tons (nongeared), and 75 to 300 tons (geared models). The electro-pneumatic friction clutch operates directly on the crankshaft.

Circle 84 on postcard for more data

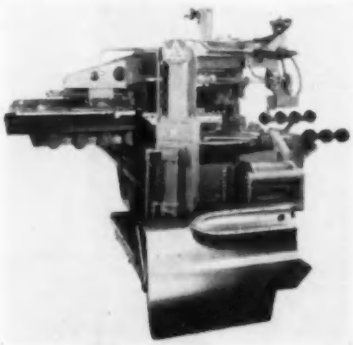


Niagara press features vibration-free construction and an automatic coil feed that permits stock to be fed at speeds up to 100 fpm. It is in a line for performing blanking, forming, drawing and perforating operations, having capacities from 60 to 300 tons.

DELTA WELDER CORP.

HEMMING MACHINE—The Delta Hemmer is a machine designed for the crimping of automobile doors, hoods, deck lids and related parts.

The door, outer and inner panels, preassembled by a few spot welds, is automated into the machine on a nonmarking, roller type outrigger. The door then moves onto a rubber roller



Delta automatic hemmer

lifter unit where it is positioned by an air actuated stop finger. A pressure pad descends simultaneously with the lifter unit positioning the door on the dies. Complete hemming is done in two operations. After the dies retract, the completed door ascends to the shuttle position where it is ejected by an air cylinder ejector onto a rubber roller outrigger. Top capacity is in excess of 700 per hour.

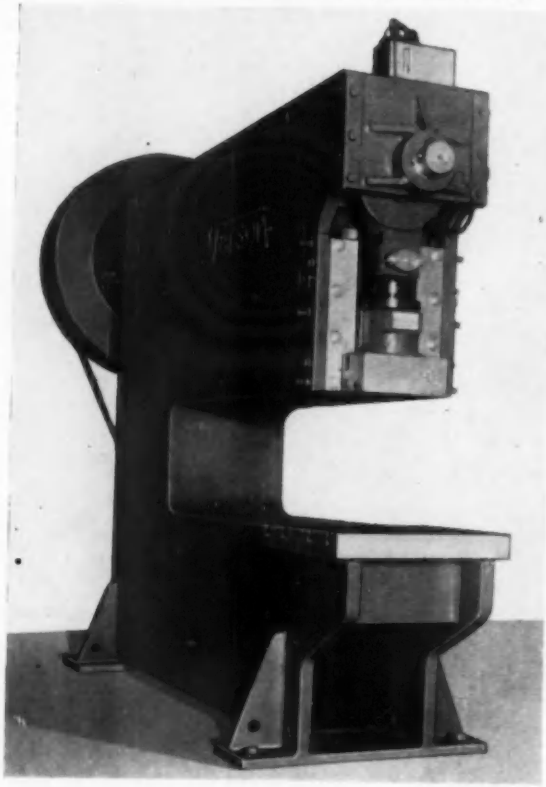
Circle 85 on postcard for more data

BALDWIN-LIMA-HAMILTON CORP.

FRAME PRESSES—Blanking and perforating operations are performed on this 250-ton double-crank straight-side press. It turns out blanks that become rear cross members for automobile and truck chassis frames. The press operates at speeds up to 33 spm powered by constant-speed a-c motors. A 400-ton unit is also available for forming operations.

Circle 86 on postcard for more data

VERSON ALLSTEEL PRESS CO.



DEEP THROAT PRESS —Made of all steel welded construction and weighing approximately 17,000 lb, this press has a depth of gap of 60 in. from centerline of the slide to the back of the gap at the frame. Capacity is 50 tons. Slide area is 10 by 12 in. and stroke is two in. Equipped with mechanical clutch and brake unit, square type gibs and an automatic lubrication system, the press requires approximately 40 by 120 in. of floor space and is 115 in. in height. It requires no pit for installation.

Circle 87 on postcard for more data

HYDRAULIC PRESS MFG. CO.

PRESS — This 500-ton open gap horn press has an eight in. throat depth, 19½ in. daylight, 6 in. stroke and a moving slide area of 14 by 14 in. The frame is of welded steel construction, fully stressed relieved prior to machining. The unit is equipped with the closed circuit Fastraverse system of operation with manual and automatic press control. The circuit has one 50 gpm radial piston pump, piston type safety valves to prevent overloading the press and pump on both forward and return strokes, and one 50 hp electric motor. The press is about 16 ft high, needs a 36 by 90 in. floor space level and a 72 by 121 in. space at the power unit.

Circle 88 on postcard for more data

DENISON ENGINEERING DIV., AMERICAN BRAKE SHOE CO.

HYDRAULIC PRESS — Two-ton press is adaptable to operations such as assembling, riveting, punching, marking, trimming, compacting, broaching, and swaging.

Features include accurate duplication of pressure on each ram stroke, precision ram alignment with the work, simple, fast setup, ample daylight to adapt a wide range of tooling, and interlocked manual and electrical controls to avoid accidental tripping of ram.

Completely self-contained, the press operates on 110 v, 60 or 50 cycle single phase circuit, or can be wired for operation on 220 v. Ram pressures range from 1000 to 4000 lb. Designed for manual or automatic production, it can be tooled with dial tables, power screw feed hoppers, stock feeds and similar accessories.

Circle 89 on postcard for more data

Denison two-ton hydraulic multipress

CLEARING MACHINE CORP.

INCLINABLE PRESSES — The Torc-Pac line of open back inclinable presses features an air-friction clutch and brake as standard equipment. The clutch and brake plates are made of sintered bronze and operate in an oil-bath at all times. Upon engagement, oil is momentarily trapped between the plates. The oil molecules are crowded to a point where the oil itself begins to transmit the pickup load. Much of the pickup is accomplished before a metal-to-metal contact of the plates takes place.

Only six bolts need to be removed to

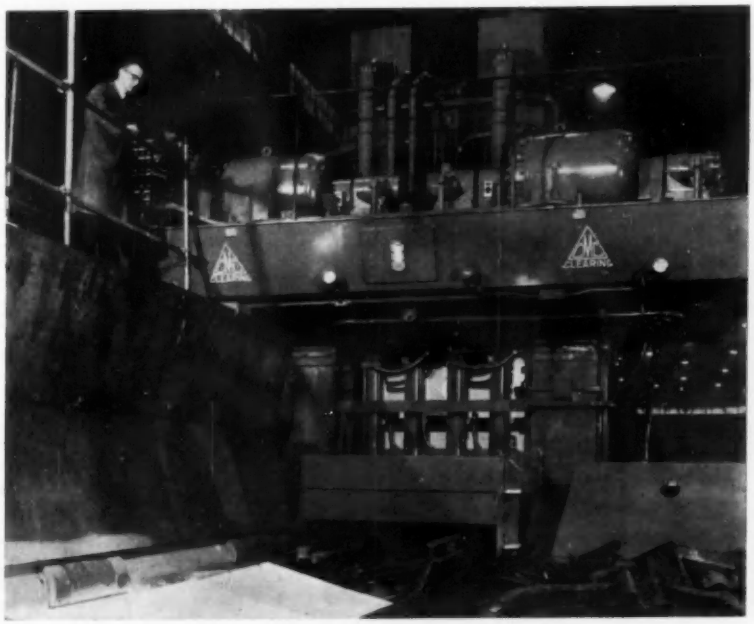
dismount the drive unit which consists of all working members of the drive and slide. The press also features an all steel welded frame; and operating controls such as four-position selector switch and run and stop buttons are standard equipment. The line is built in capacities of 22, 32, and 45 tons.

Circle 90 on postcard for more data

SHEAR—A 600-ton capacity shear, weighing about 335,000 lb, was designed for cutting steel scrap into usable lengths.

The 22 ft hydraulically-tilted hopper and a feed box with a hydraulic ram feed scrap into the blades at any predetermined length of push from 6 to 48 in., in 6 in. increments. Feed and shearing cycle are fully automatic; and the shear will cut mildsteel rounds to 5⅜ in. diam or plate to 1¼ in. thick. The unit can process up to 30 tons of scrap per hour, depending upon the type and size of material.

Circle 91 on postcard for more data

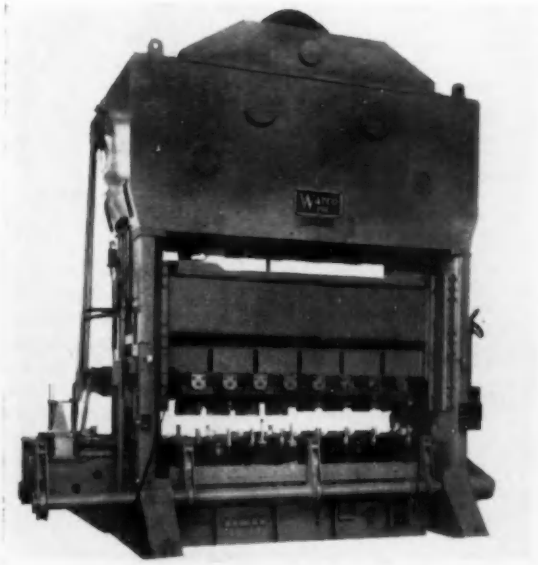


Clearing shearing press is capable of cutting up to 30 tons of scrap per hour

FEDERAL MACHINE & WELDER CO.

AUTOMATIC PRESS—This Warco 350-2-144 twin drive, two point press has an automatic transfer feed for producing headlamp housings. The right to left motion of the feed and the blank pickoff motion are operated from cams on left end of press, and the in and out motion of the feed is operated from cam on the right end of press, with motion transmitted to opposite end by torque tubes. The feed bars are driven in and out at four places to give smooth operation without backlash. Output is 1100 aluminum or 950 steel parts an hour.

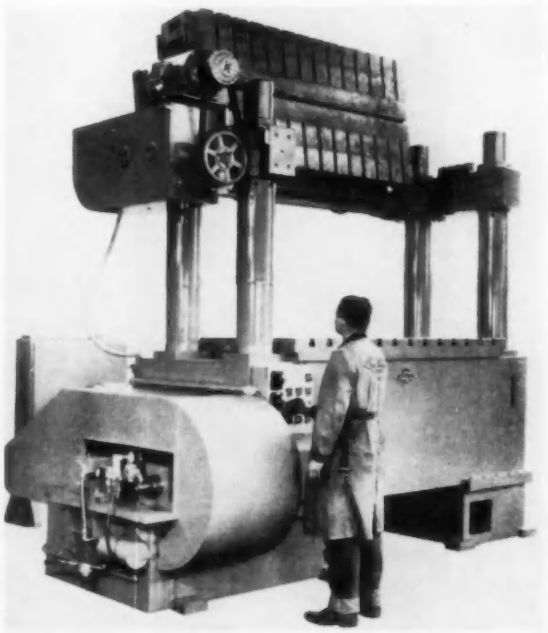
Circle 92 on postcard for more data



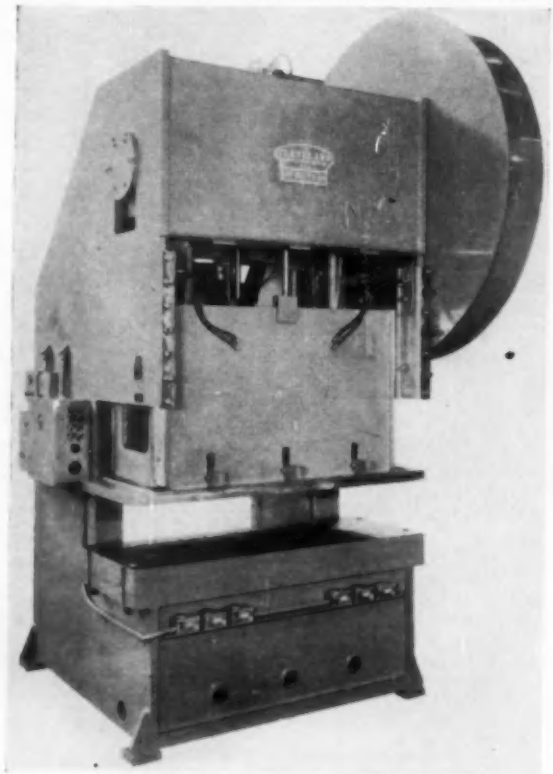
ALPHA PRESS & MACHINE, INC.

DIE TRYOUT PRESS—This 300 ton press has been added to a line of mechanical die tryout presses. The slide rotates up to 270 deg from its normal position, permitting accessibility to the die with full safety. Less than a minute is required to return the slide and upper half of the die to the running position.

Circle 93 on postcard for more data



CLEVELAND PUNCH & SHEAR WORKS CO.



GAP PRESS — This double - crank open-back gap press, designed for automatic feeds and convenience in handling large or irregular sheets, features welded steel construction and an electrically controlled drum type friction clutch. The slide is provided with power adjustment, is air - counterbalanced, has a stroke of 10 in. and 5 in. adjustment. Shut height is 22 in. Both bed and slide have an area of 28 by 72 in. All gears and drive mechanisms are completely enclosed. An auxiliary air brake on the flywheel insures a quick stop. Presses are available in an almost unlimited range for the punching, shearing, perforating, bending and forming of metal, from light sheet to heavy plate.

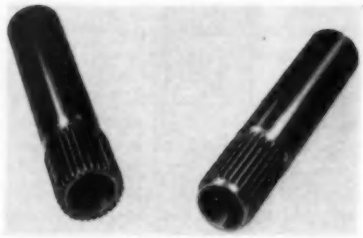
Circle 94 on postcard for more data

Bliss enclosed straight side double action press is equipped with an in-built oil lubricating system. Plunger and blank-holder gibs, slide adjusting mechanisms, flywheel and linkages are included in the recirculating oil system. Flywheel, driveshaft, intermediate shafts and slide adjusting mechanisms are mounted on anti-friction bearings. Presses in the series can be furnished with rolling bolsters and with automatic die clamping on both plunger and blank-holder slides to permit rapid die changing.

MICHIGAN TOOL CO.

SPLINE ROLLING — Newly developed tooling for Roto-Flo cold-rolling machines permits inexpensive production of splines or serrations on thin-walled tubing ranging from ½ to about 2 in. O.D.

The process uses an axially fed blank and a new-type cylindrical forming rack. Splines can be formed



Spline rolling of thin-walled tubular parts is possible with a new Roto-Flow method.

on solid-shaft parts as well as tubular parts. Splines and serrations up to 12 in. long can be cold rolled with this process. Thin-walled tubular parts having as little as 0.075 in. from the root of the tooth to the ID of the tube can be splined or serrated since required pressures are relatively low.

Circle 95 on postcard for more data

E. W. BLISS CO.

PRESSES—Enclosed straight side double action presses, designed to operate at high speed and maintain draw speed of 75 fpm, are available in capacities from 300 to 1600 tons. They are offered in JIC sizes starting from 72 by 48 in.

These presses may be equipped with electronic press drive which permits reverse jogging without stopping and reversing the motor. A servo system controls clutching and braking, electronically compensating for heat and pressure variations.

Circle 96 on postcard for more data

BAIRD MACHINE CO.

WIRE FORMING — Design features of the Model 00 automatic four-slide wire forming machine include a "flip top" vertical swing bed which permits raising of the machine to vertical positions for tooling, adjustment and maintenance. When in operation the horizontal position is used. The machine provides feed length up to 4¼ in. with ample tooling areas at each position.

Circle 97 on postcard for more data

TAYLOR-WINFIELD CORP.

TANGENT BENDERS—Air-operated tangent bending machines designed specifically to meet the need for inexpensive, rapid, light-duty metal forming equipment are being offered.

The benders are useful on products requiring radius or square bends in sheet metal, extruded or tubular sections, and are available in single-wing, duplex and quadruplex models.

Circle 98 on postcard for more data

E. W. BLISS CO.

PIPE STRAIGHTENER—A standard inclinable press has been equipped with support rolls, special frame, type "K" clutch and an air counterbalanced slide with motorized adjustment for special pipe straightening adaptations. It is operated by a foot switch on a "jog" type of operation. On the same floor plate there are two additional foot switches to raise or lower the slide, so that the operator can adjust it from whatever position he is working.

In this application, a set of rolls is furnished with the press to handle pipe from 1.660 to 4.5 in. diam. To accommodate various size bends, the roll brackets may be moved in or out the full width of the table.

Circle 99 on postcard for more data

BESLY-WELLES CORP.

THREAD FORMER—The Besly X-Press tap cold forms internal threads without cutting, in copper, brass, aluminum, lead, zinc, die castings, leaded steels and other ductile metals. The thread is formed under pressure, and the tap itself has no flutes or cutting edges. Tap breakage due to chips is eliminated because there are no chips produced.

Circle 100 on postcard for more data

WIEDEMANN MACHINE CO.

PUNCH PRESS—The 80-ton RA-101 turret punch press locates holes to a full-size drawing.

The metal to be pierced is secured to the movable cross-slide of the press in direct relation to the drawing, or template. This cross-slide is moved manually in any direction until the magnified center lines of a hole location on the template line up with the cross hairs on a large glass screen. The press is then tripped, and the operator proceeds to the next hole location.

Circle 101 on postcard for more data

CHAMBERSBURG ENGINEERING CO.

DROP HAMMER—Designed for precision blow control and the use of automatic feeding devices, a new electrically-controlled gravity drop hammer performs such operations as forming, embossing, coining, and re-striking in a single die impression. Precise blow control is achieved by maintaining close pressure tolerances on the air supply and by fine adjustment of a regulating valve on the hammer's exhaust air system. The electrical control arrangement permits synchronization of feeding devices, giving completely automatic operation; and also permits the installation of safety devices to protect the dies.

Circle 102 on postcard for more data

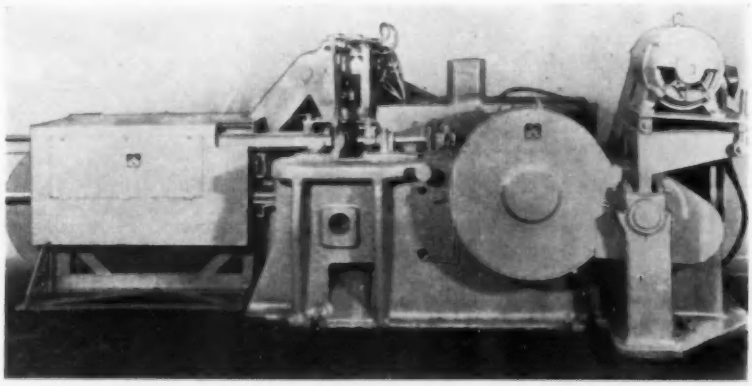
MINSTER MACHINE CO.

BLANKING, PERFORATING—Single point straight side presses designed for automatic production are available in 75, 100 and 150 ton capacities. Applications include progressive die blanking and perforating operations with heavy shock loads.

The box type frame is of high tensile alloy cast construction. All wear points are nickel-bronze lined. Fixed or variable speed drive is available. The single point box-type slide maintains precise slide to bed parallelism. It is equipped with eight bronze-lined ways widely spaced front to back and is guided in cast gibs. The presses are of the vertical type but all sizes can be inclined to 27½ deg for part drop-out.

Circle 103 on postcard for more data

HILL ACME CO.



UPSETTING MACHINE—Model XN automatic forging machine produces up to ¾ in. diam square or hex head bolts with a length up to 24 in., at the rate of 60 per minute. A finished upset forging is produced every revolution of the machine.

Circle 104 on postcard for more data

There's an AJAX FORGING MACHINE . . .

— For Every Field of Upset Forging in Industry —

BUILT IN TWELVE SIZES 1" to 12"

Choose from a complete line of AJAX Forging Machines to make the forged parts you need—

AUTOMOTIVE — Transmission Gears — Flanged Axle Shafts — Crankshaft Flanges & Drag Links

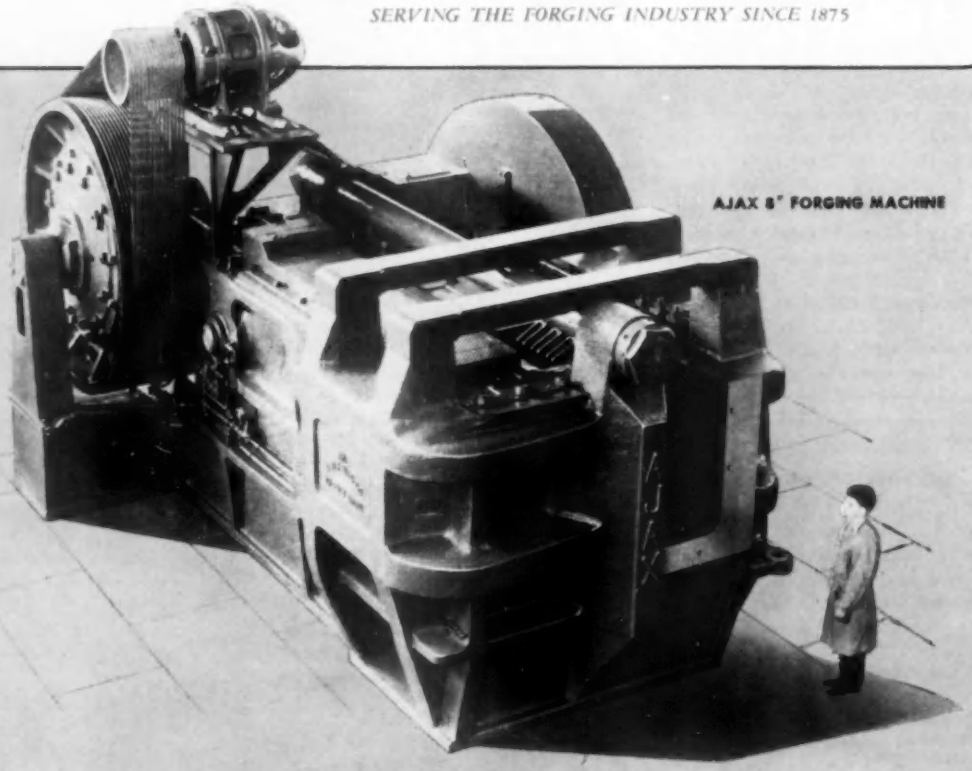
AIRCRAFT — Cylinder Heads & Jet Blade Blanks

AGRICULTURAL — Implement & Tractor Forgings

RAILROAD — Freight Car Brake Levers — Grab Irons & Brackets

For Higher Production and more accurately Forged Parts — Specify AJAX Forging Machinery

SERVING THE FORGING INDUSTRY SINCE 1875

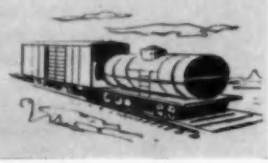


AJAX 8" FORGING MACHINE

AIRCRAFT

AGRICULTURE

AUTOMOTIVE



RAILROAD

AJAX METAL WORKING MACHINES

FORGING PRESSES — FORGING MACHINES — FORGING ROLLS — AJAX-HOGUE WIRE DRAWERS

THE AJAX MANUFACTURING COMPANY . . . . . CLEVELAND 17, OHIO

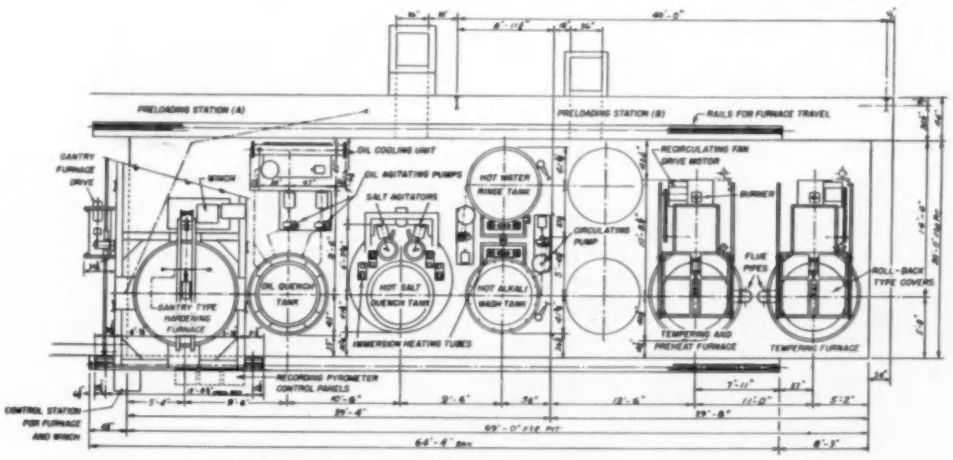
CHICAGO OFFICE: 110 S. DEARBORN ST., CHICAGO 3, ILLINOIS

W. P. WOOLDRIDGE CO. · BURLINGAME, CAL. · LOS ANGELES 22, CAL.

COATING
HEAT TREATING
PAINTING
PLATING
CLEANING

Processing Equipment Section

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 139



Lindberg gantry type controlled atmosphere hardening furnace for hardening guided missile and aircraft landing gear components improves metallurgical properties of the work being treated because the operator has better control over the work in process. With a capacity of 10,000 lb, the furnace can control hardness and carbon content within five per cent.

LINDBERG ENGINEERING CO.

HARDENING FURNACE — A controlled atmosphere hardening furnace with a frame structure raised on side supports so as to span over either a preloading station or adjacent oil and salt quench tanks has been designed for hardening guided missile and aircraft landing gear components.

The furnace shell is welded gas tight throughout to prevent contamination of the atmosphere by air infiltration and will accommodate a loading fixture with an effective work load 12 ft long by 5 ft in diameter. The work chamber is lined with light weight refractory, backed by courses of medium and low temperature slabs. Control of the furnace door, winch and longitudinal travel of the furnace is accomplished from a pushbutton control station with operator's platform which is built into the left side of the furnace base structure. Three recording pyrometer control panels, one for each zone of control automatically control the required temperature in the furnace chamber.

Circle 105 on postcard for more data

PANGBORN CORP.

BLAST CLEANING MACHINE — Loads of castings, forgings and heat treated parts weighing up to six tons can be blast cleaned in the 72 cu ft Rotoblast barrel. The unit will clean a six ton load of castings in five minutes. The 72 Type GN barrel is equipped with two Rotoblast wheels, each capable of throwing 120,000 lb of abrasive per hour. Each wheel is powered by a 40 hp motor. Heavy-duty motors are also utilized to power the shake conveyor, the barrel door and the abrasive elevator. All operations on the barrel including loading, starting, stopping and unloading are automatically operated from a control panel. The barrel is 21 ft-55 in. wide by 10 ft-11 in. deep by 23 ft high.

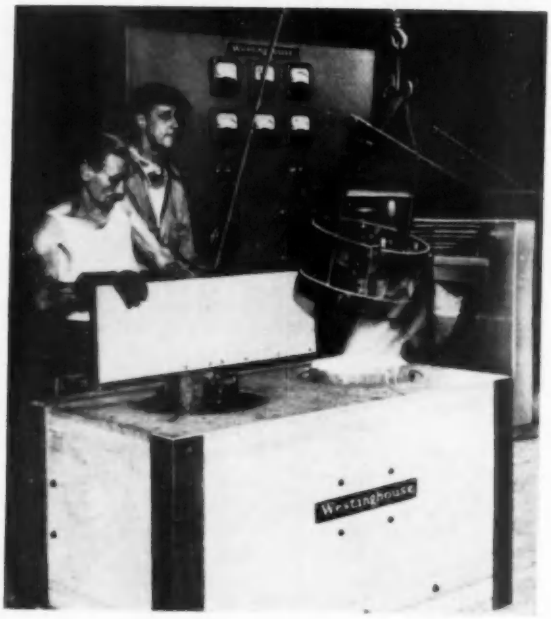
Circle 106 on postcard for more data

CONSOLIDATED ELECTRODYNAMICS CORP.

GLOW DISCHARGE UNIT—The LC-031 glow discharge unit is capable of delivering 400 ma at a full 5000 volts dc. The unit aids operators of large vacuum coaters. It will bombard the surface with a high velocity due to high accelerating voltage, resulting in a clean surface for coating.

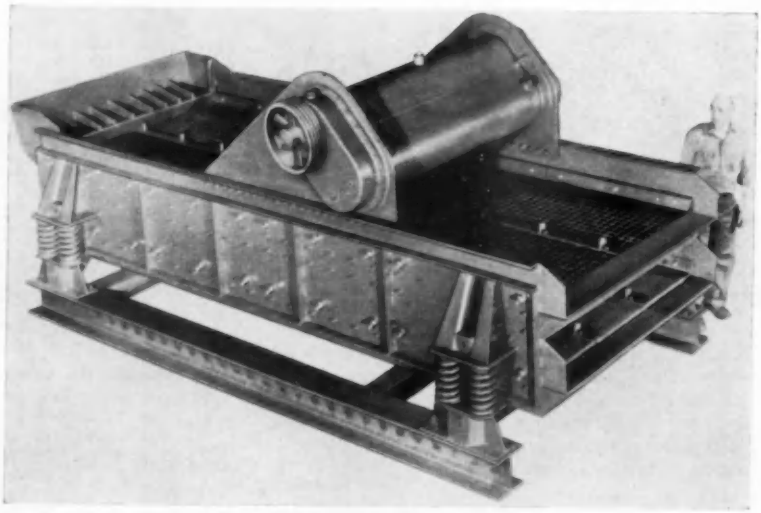
Circle 107 on postcard for more data

WESTINGHOUSE ELECTRIC CORP.



INDUCTION MELTING FURNACES — Induction melting furnaces (push-out and tilting-type) with 50 to 5000 lb capacity are now available. Using 30 to 1250-kw motor - generator sets, both furnaces produce uniform analyses. Their high melting speed at frequencies from 960 to 10,000 cps minimizes metal loss, and there is nothing to contaminate the molten pool. Advantages claimed include; water-cooled leads; compact control station; and heavy-duty water-cooled selector switches, up to six switches, can be installed in one control station.

Circle 108 on postcard for more data



LINK-BELT CO.

Link-Belt heavy-duty Straightline horizontal vibrating screen. CL Model 58

VIBRATING MACHINE—A heavy-duty Straightline horizontal vibrating screen, CL-Model 58, has been designed for dewatering, washing and sizing a wide variety of materials. It can be cable suspended or floor mounted. Where conditions warrant, a combination of both mountings can be used.

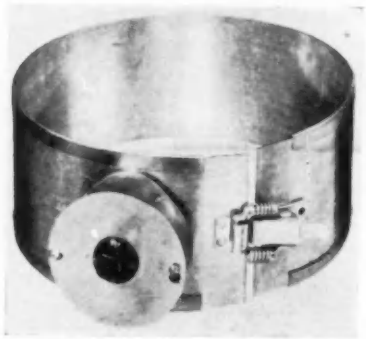
The machine achieves a high intensity motion by centrifugal force, unbalanced shaft vibrators. Two eccentric shafts in the vibrator are rotated by a helical gear speed reducer, giving the screen its straightline motion. The machines are made with single or double decks in 15 sizes ranging from 4 by 8 ft to 6 by 16 ft. All screens are equipped with a snubbing device that limits motion during acceleration and deceleration and automatically eliminates critical vibration in the resonance speed range.

Circle 109 on postcard for more data

ACRA ELECTRIC CORP.

CONTAINER HEATER—The Wrap-It-Heet PH-5 container heating element is for use on standard five gallon straight side steel pails or containers which are approximately 11¼ in. diam. The device is used to heat or melt waxes, resins, adhesives, feed mixtures, oils and non-volatile chemicals which require heating to facilitate melting or removal from the container.

The watts density is said to be so low that it will not burn materials



Acra heating element for containers

which have a slow heat acceptance factor. Model PH-5, rated 1250-w at 115-v, is suitable for ac or dc operation. It is equipped with a three-heat switch and has a spring-loaded snap latch device to attach it to the container.

Circle 110 on postcard for more data

PANTEX MFG. CORP.

STEAM-JET CLEANER—The Speedylectric standard steam-jet cleaner carries a maximum rating of 20 kw per hr and, under normal operating conditions, usually consumes 15 to 18 kw per hr. Units are available for 200 V, 440 V or dual voltage 220/440 V, three phase, 60 cycle. The machine operates on the electrode principle and has no tubes. It is free from fire and explosion hazards. Machine tools, presses, conveyors, intricate machinery, and other equipment may be steam-jet cleaned in place during regular working hours. Utilizing the blast of hot dry steam, alone, or mixed with concentrated detergents or solvents, the operator has fingertip control of the amount of liquid used in the cleaning operation. Flooding of the working area is eliminated or held to a minimum consistent with the type and amount of dirt accumulation to be removed.

Circle 111 on postcard for more data

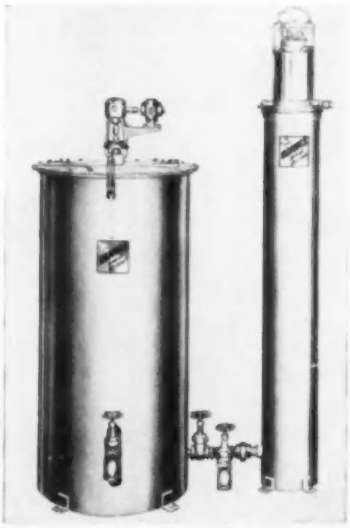
INTERNATIONAL NICKEL CO., INC.

NICKEL REFINING PROCESS—A main feature of a process for the electrorefining of nickel is the direct electrolysis of nickel matte, an artificial sulphide. The process eliminates high-temperature oxidation and reduction operations, with attendant losses of metals, sulphur and selenium. Instead, nickel sulphide of low copper content from the Bessemer converter or other source can be cast directly into sulphide anodes and electrolyzed for the production of high quality nickel. Another feature is the commercial recovery of elemental sulphur and selenium as by-products, in addition to cobalt and precious metals conventionally recovered. Sulphur-selenium separation is accomplished in a 100 ft high fractionating column of special design.

Circle 112 on postcard for more data

BINKS MFG. CO.

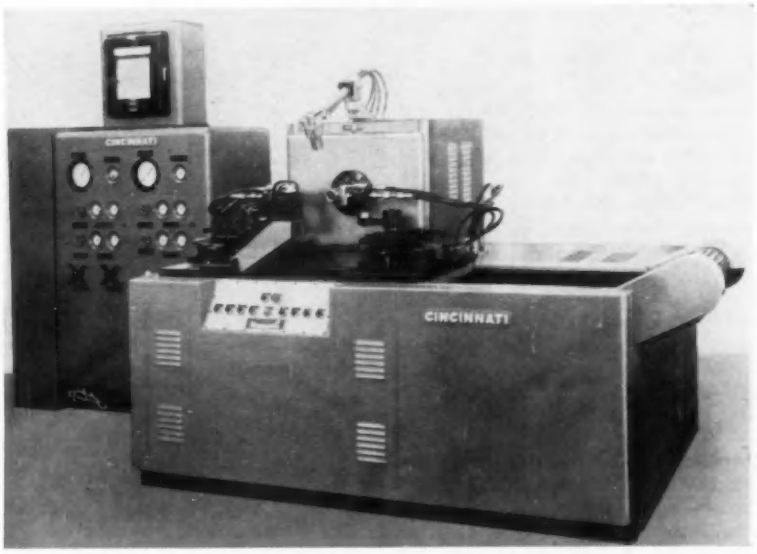
PAINT CIRCULATING PUMPS — The "Kayo" series of paint pumps is designed to deliver a steady flow of paint while operating at minimum speeds at less air consumption. The pumps feature the automatic demand principle. When demand on the system is low the pumps operate more slowly, but when more spray guns are opened the pumps speed up immediately to supply more material. Air consumption is 2 cfm per gallon at delivery pressure of 80 psi.



Binks "Kayo" series paint spraying pump

With its large capacity, the pump is capable of supplying up to 55 paint spraying stations.

Circle 113 on postcard for more data



Cincinnati heating machine with spindle speeds variable from 15 to 375 rpm

CINCINNATI MILLING MACHINE CO.

HEAT TREATING MACHINES — This selective flame heating machine embodies the building-block principle of construction, and is applicable where high or low heating capacities are required.

The flat-bed base unit acts as the supporting member for work-holding and handling fixtures and flame heads. The base houses a large volume quench tank with high-capacity heat exchanger, automatic quench agitation system and a large work removal conveyor which can be timed to operate continuously or intermittently with each heating cycle. Rhomboid type flame heads with removable tips are normally employed in conjunction with the rotating spindle work unit. An electronic temperature control automatically stops the heating cycle and causes the work piece to be dropped into the quench tank.

Circle 114 on postcard for more data

WALL COLMONOY CORP.

HARD-FACING POWDER—A nickel-base hard-facing powder containing tungsten carbide and chromium borides, named Colmonoy, No. 75, is recommended for use with the Sprayweld process in applications requiring resistance to abrasions or to combined abrasion and galling.

The tungsten carbide makes it suited to applications involving wear caused by scrubbing action or metal-to-metal contact. Part shape is no limitation.

Circle 115 on postcard for more data

CINCINNATI MILLING MACHINE CO.

HARDENING MACHINES — Two hardening machines have been designed for hardening automotive parts. One of these is the 15-kw, water cooled Inductron induction heating machine. It will automatically harden both ends of push rods. The other unit is a Flamatic hardening machine whose features include "building block" construction. Cup and pad sections of rockerarms can be flame-hardened six at a time, using natural gas for fuel.

Circle 116 on postcard for more data

SUNBEAM CORP.

FURNACE — Combination melting-holding furnaces in capacity sizes from 1200 to 1500 lb may be used for die casting, permanent mold casting or sand casting of aluminum. They are gas fired and automatic temperature controlled.

Rejects and back scrap can be charged back on the sloping hearth, eliminating any contamination of the inside of the furnace with inserts. Melt loss is reduced by a deep bath and radiant roof heating.

Circle 117 on postcard for more data

THE DeVILBISS CO.

SPRAY EQUIPMENT—Spray equipment for cooling and lubricating forming and cutting tools for metal and plastics is designed to supply a fine mist of coolant liquids or light cutting oil at the point of contact between the tool and the material. Called the Multi-Mister, the equipment operates from the main air line and does not require regulators. It can be quickly attached to lathes, mills, screw machines, drill presses, power saws, internal and external grinders, jig borers and machines not designed to work wet.

The equipment consists of one or more adjustable tip spray nozzles and brackets for mounting, wear-resistant flexible tubing to carry air and coolant to each nozzle, and supply tank equipped with suction tube, strainer and header to which the tubing is attached.

Circle 118 on postcard for more data

ALMCO, QUEEN PRODUCTS, INC.

BARREL FINISHING MACHINE—The Supersheen Model EB-3032 barrel finishing machine has a 30 in. diameter by 32 in. long barrel for high volume finishing of small parts as well as fast action on large castings and forgings. Total barrel capacity or 13.8 cu-ft of 1000 lb can be divided into two compartments if desired.

The barrel is driven by a 1½ hp motor through a helical gear speed reducer which gives 97 per cent efficiency under full load. A variable speed control allows adjustment of barrel rotation speed from 10 to 30 rpm.

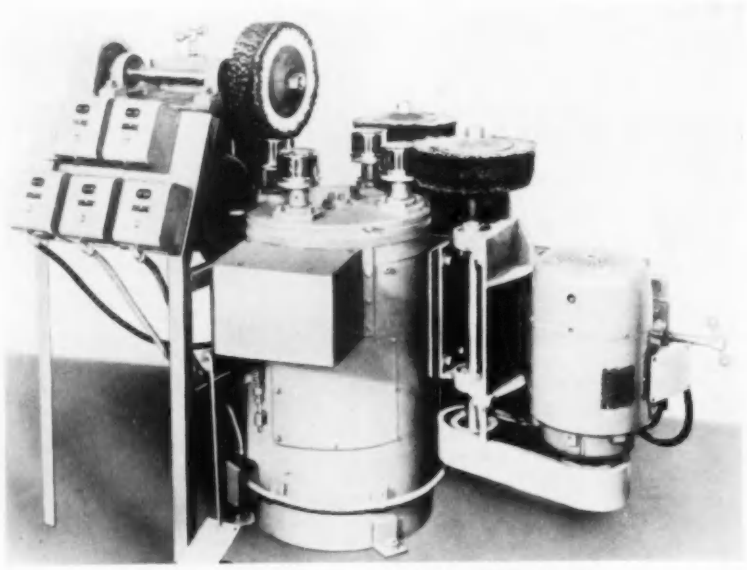
Circle 119 on postcard for more data

METAL & THERMIT CORP.

COPPER PLATING PROCESS — A bright cyanide copper plating process uses a new combination of additives. One chemical determination and a single Hull Cell test are required to control the additives.

The solution is made with either sodium or potassium salts. Permissible cathode current densities range from 10 to 60 ASF. Neochel, a new bath additive, is said to minimize anode corrosion and rough deposits. Two brighteners and a wetting agent comprise the other additives. The process is applicable to automatic, still and barrel plating.

Circle 120 on postcard for more data



Murray-Way junior automatic polishing and buffing machine

MURRAY-WAY CORP.

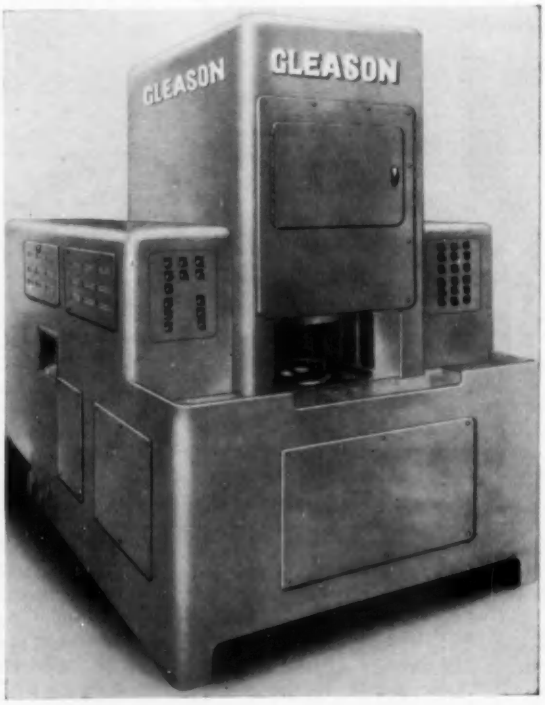
POLISHING MACHINE—The Murray-Way junior automatic is a small automatic polishing and buffing machine featuring unitized construction. On the hand index table, the work dwell time is controlled by the operator and can be as long as necessary. On the automatic index table, the work dwell time is controlled mechanically, and is varied by moving a chain on stepped sprockets. The machine, with a full complement of three heads uses about 6 by 8 ft.

Circle 121 on postcard for more data

THE GLEASON WORKS

QUENCHING UNIT —The No. 117 quenching press utilizes many new methods for handling and quenching heated gears and other round, flat and cylindrical parts so that they may be quenched without distortion. Ring gears and cylindrical parts up to 8½ in. maximum diameter and 8 in. maximum height Cylindrical parts such as spur gears, liners, bearing racers and disks and other various parts can be accommodated in this machine. It is desiged for quenching oil only and is mechanically operated. The contact ring pressures are obtained by hydraulic means and the hydraulic fluid used in the machine is of the non inflammable type.

Circle 122 on postcard for more data



Extra high-volume air-operated paint circulating pumps

A new line of air-operated pumps has been developed to meet the special needs of high-volume industrial finishers. Known as the "Kayo" series, the pumps deliver a steady flow of paint while operating at low speed.

The largest pump, the Kayo 32, is designed to deliver 32 ounces of paint with each 10" pump stroke or one gallon of paint every two pumping cycles. A pump of this type can supply as many as 55 spray painting stations in a paint circulating system.

This installation of Binks Kayo 32 pumps is typical of automotive plant installations now in operation. Working from standpipes, the pumps supply 16 identical matched colors to 60 spray stations. Paint circulating system is 6000' in length.

Operating on an automatic demand principle, the pump promptly adjusts its pumping rate to provide an even, regulated flow of paint at each spraying station regardless of the number of spray guns in use at any time.

The air-operated pump motor requires only 2 cfm per gallon of paint pumped at 80 psi. Air motor and pump are completely space separated to eliminate any possibility of paint entering the motor to cause malfunction or damage. Other features are reported to give long life and dependable operation. Air motor piston cups are self-oiling. The paint pump piston requires no oiling. Pump castings are of high density alloys. Double tube construction keeps moving parts in rigid, permanent alignment. Simple pump design permits easy in-plant replacement of parts if and when required.

"Kayo" pumps are manufactured by Binks Manufacturing Company, 3120-30 Carroll Ave., West, Chicago 12, Ill. Complete information on these pumps is available.

65% savings in paint!

Ⓐ To clean-out a conventional spray gun after transferring to another paint line, 7 to 10 ounces of paint must be "bled" to prevent a color inter-mix.

Ⓑ Only 2 to 4 ounces of "bleed-out" paint are required to clean-out the new Binks Model 19J spray gun —a 65% material savings.

New Binks spray gun for circulating systems

Cuts clean-out costs 65% when changing colors

Plants using multiple-color paint circulating systems frequently shift spray guns from one color line to another. To clean the old color out of the spray gun the new color must be run through the gun (and quick detachable hose connection) until there is no danger of inter-mix. Paint lost through this "bleeding" operation runs between 7 and 10 fluid ounces.

New spray gun cuts "bleed" losses almost 65%. Binks Model 19J spray gun, when used with the same quick detachable hose connection, slashes "bleed-off" losses. Only 2 to 4 fluid ounces must be passed through the passages to make certain there is no inter-mix to cause a finish reject.

Unique design features. Binks Model 19J is an efficient, dependable production spray gun in every respect. Its paint saving characteristics are achieved through two unique internal design features. Design feature number one greatly reduces the amount of paint contained between material inlet and nozzle orifice over that contained in conventional spray guns. Feature number two eliminates all "pockets" in the gun head which can trap paint. This also contributes to faster cleanout with less waste.

Automatic model available. Binks Model 21J is an automatic spray gun, triggered by air pressure. On automatic painting machines it provides the same paint saving economies as the Model 19J.

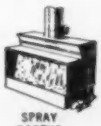
All the facts in Bulletin RFG. Get the complete story on these two new Binks spray guns. Ask your Binks industrial distributor for a copy or write direct to the address below.

Ask about our spray painting school
Open to all...NO TUITION...covers all phases.

7736

Binks
EVERYTHING FOR SPRAY PAINTING

SPRAY GUNS


SPRAY BOOTHS

NATIONWIDE SERVICE

Binks Manufacturing Company
3120-30 Carroll Ave. West, Chicago 12, Ill.

REPRESENTATIVES IN PRINCIPAL U.S. & CANADIAN CITIES • SEE YOUR CLASSIFIED DIRECTORY

ALLIS-CHALMERS

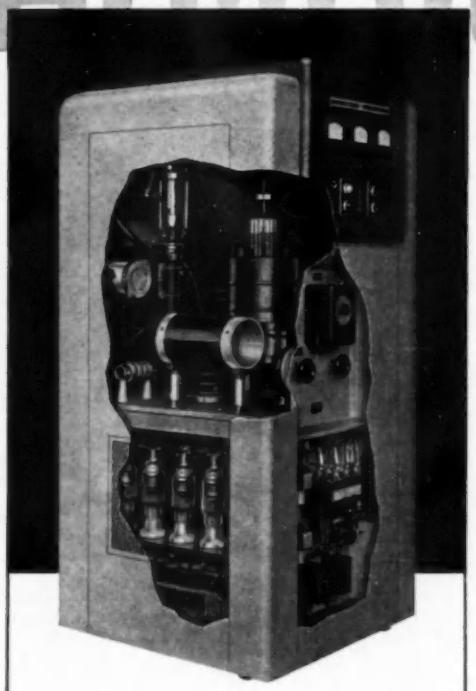
This is What Careful Buyers Want to Know about Induction Heating Equipment...

First — they want to know that they will get cost-cutting performance and dependability. This is basic... and it is the basic reason for the widespread acceptance of Allis-Chalmers induction heaters for hardening, annealing, brazing, melting.

Then — careful buyers want to know how well the equipment is backed up by the manufacturer's experience, engineering, research and service facilities. Again, Allis-Chalmers excels.

A-C engineering includes help in planning the most efficient use of induction heating in your operation, the design and manufacture of work fixtures and handling equipment, the testing of your material samples in A-C's modern laboratory. When your heater is installed, a field engineer from one of the A-C regional offices near you supervises the job.

There is an A-C representative in your area who can give you more details. Call him, or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin, for Bulletin 12B6430B.



Check These Quality Features

1. Water-cooled oscillator tube has life expectancy of 5000 hours or more — with ample reserve capacity for emergencies.

2. Plate transformer is designed for continuous, heavy-duty service... has large reserve capacity.

3. Six-tube, three-phase full-wave rectifier section is standard... choke coil and capacitor network protect rectifier tubes from high-frequency currents.

4. Compact, attractive all-steel cabinet provides electrostatic and electromagnetic shielding.

5. Output circuit is based on simple principle which eliminates need for extra, expensive output transformers.

6. Precision automatic timer and all necessary controls are standard. No extras (except handling equipment) required.

7. All operating controls are clearly marked and mounted on one panel.

8. Safety features: heavy-duty control, high water temperature switch, high and low water pressure switches, fuses, interlocked doors.

And ... Bakelite standoffs, adequate clearances, clean wiring arrangements, ceramic coils, heavy duty relays.

A-C ALLIS-CHALMERS

A-5775

INDUSTRIAL TRUCKS

TRANSFER UNITS

CONTROLS

FEEDING DEVICES

LOADERS

UNLOADERS

AUTOMATION and MATERIAL HANDLING SECTION

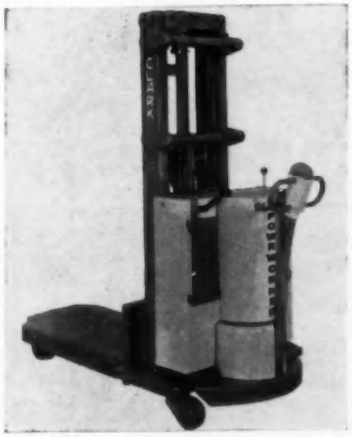
FOR ADDITIONAL INFORMATION, please use reply card on PAGE 139

CLARK EQUIPMENT CO.

HIGH-LIFTING UNITS — Two new units have been added to the "Powrworker" line of battery-powered hand trucks.

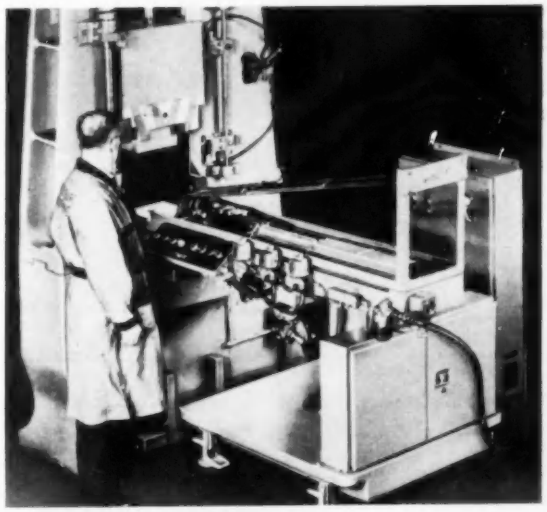
The high lift pallet truck is designed to handle single-face pallets. The high lift platform truck has platforms available in lengths from 36 in. through 60 in. Both units will lift a 4000 lb load 130 in. or more, depending on the application. Overall width is 42½ in. A feature of both units is an articulated drive unit, which raises or lowers three inches to compensate for uneven floor conditions. This prevents loss of traction.

Both machines will travel two mph loaded and have a lift speed of 12 fpm loaded. Either a single row or double row 12 v battery can be used. With single row batteries, the machines are less than 32 in. longer than the load. Without batteries, the high lift pallet truck weighs 3310 lb and the high lift platform truck weighs 2950 lb.



Clark "Powrworker" high lift platform truck

Circle 124 on postcard for more data

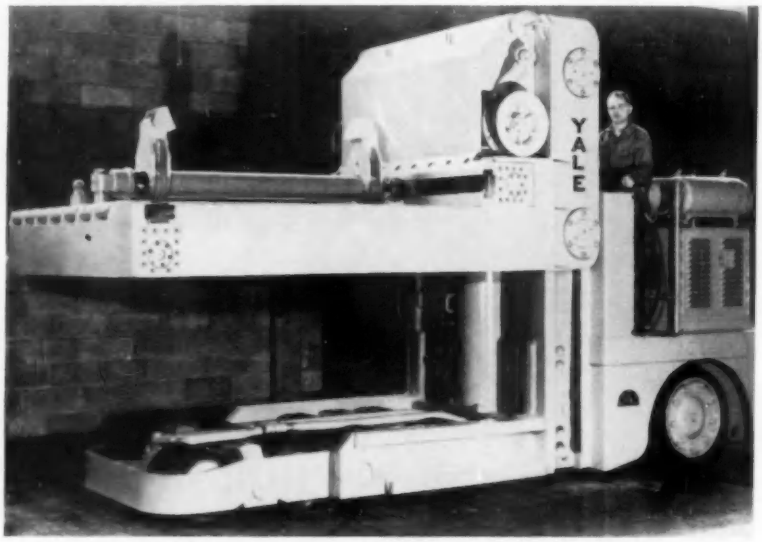


Semi - automatic feed for coining operations on Chambersburg forming drop hammer.

CHAMBERSBURG ENGINEERING CO.

FEED DEVICE FOR FORMING DROP HAMMER—A new type feed permits semi-automatic re-strike or coining of forgings, when used in conjunction with Chambersburg's new electrically controlled piston-lift, gravity drop hammer, known as the Forming Drop. The feed, which is especially designed for coining operations, is mounted on a movable base, adjustable to suit various die heights. If access to the die area is necessary, as for die changes, the feed may easily be swung out of the way. Magazine and pusher plates may be rapidly changed to suit different forgings to be coined. Or, when desired, the entire feed mechanism can be moved away, permitting manual and foot treadle operation, as with conventional hammer.

Circle 123 on postcard for more data



Yale & Towne versatile die handler side or end loads 60,000 pounds

THE YALE & TOWNE MFG. CO.

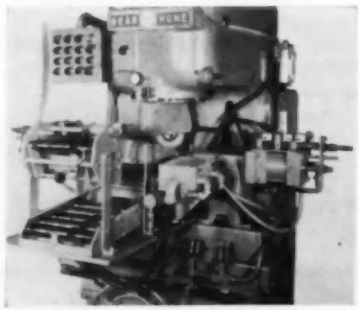
DIE HANDLER — An electric-powered die handling lift truck is available to end load or side load dies weighing 60,000 lb. Bollard extensions are provided for accurate die placement in press or storage. The extensions are designed into the pusher bar which joins the side-loading bollards and are put into position manually when extra thrust beyond the dimensions of the truck platform is necessary for proper placement. The bollards are hydraulically controlled to move dies sideways across the truck's 84 in. wide platform.

In its lowered position the truck's platform is 18 in. from ground level. A lift of 75 in. is controlled hydraulically. Dual controls, on either side of the operator's platform give good visibility for most operating conditions.

Circle 125 on postcard for more data

NATIONAL BROACH & MACHINE CO.

ROCKER-TYPE LOADER—A loader for handling long shaft, unsymmetrical gears on both gear tooth honing machines and rotary gear shaving machines has a built-in gaging device, magazine feed, and an air-powered rocker-type loading mechanism. A discharge chute that feeds finish-honed parts to the unloading position in front of the operator is also included.



National loader for handling gears

Operation of the loader is entirely automatic when used in conjunction with standard gear tooth honing machines or rotary gear shaving machines equipped with suitable controls and air-powered head and tail stocks.

Circle 126 on postcard for more data

ALLIED RESEARCH PRODUCTS, INC.

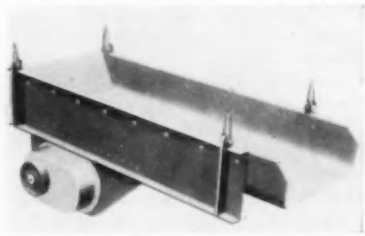
AUTOMATIC LOADER—The Wagner Auto-Loader provides completely automatic transfer of parts between monorail conveyors and automatic metal finishing machines. It is used in conjunction with such processes as electroplating, anodizing, Iriditing, phosphating, painting, cleaning and other continuous finishing systems.

The unit consists of a hydraulically powered reciprocating carriage mounted on channel tracks. Cam followers raise and lower the lifting arms according to the contour of the side plates as the carriage moves on the tracks. The load-unload cycle can be controlled by the limit switches of the automatic machine. Racks removed from the finishing system can be loaded onto a monorail conveyor for movement to further processing as parts to be finished are loaded into the automatic. The machine will easily accommodate a monorail conveyor operating on different planes.

Circle 127 on postcard for more data

LINK-BELT CO.

VIBRATING FEEDER — Straight-line geared counterweight vibrating feeders are designed for feeding a wide range of bulk materials at high rates. Capable of absorbing great impacts, the unit can be mounted directly under a hopper or bin to feed, convey, pick or scalp materials. A geared eccentric shaft mechanism produces a high intensity straight-line

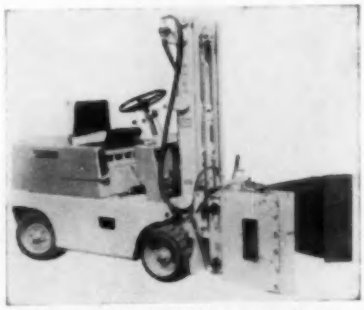


Link-Belt straightline vibrating feeder

stroke that ranges in amplitude from ¼ to ½ in. up to 900 rpm. The feeder can be floor supported or suspended by cables from bins, tanks or hoppers.

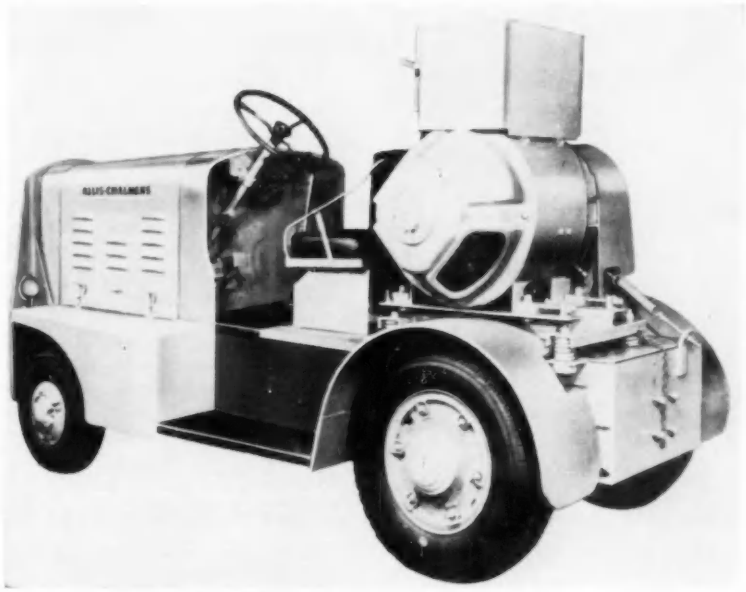
Circle 128 on postcard for more data

CLARK EQUIPMENT CO.



ROLL CLAMP ATTACHMENT—This attachment for a line of fork lift trucks is designed to handle paper and corrugated stock rolls up to 60 in. in diameter and 6000 lb in weight. It provides 180 deg of rotation, vertical through horizontal through vertical.

Circle 129 on postcard for more data

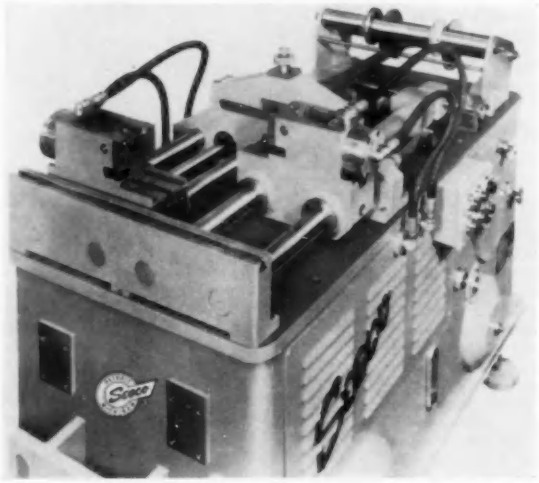


ALLIS-CHALMERS MANUFACTURING CO.

INDUSTRIAL TOWING TRACTOR AND LIFT TRUCK—The new TG-45 industrial towing tractor is shown equipped with a 300-amp welder. It is a 4500-lb draw-bar pull capacity unit, with low silhouette and of compact design capable of towing 90 to 100 tons on level surfaces.

Circle 130 on postcard for more data

SESCO, INC.



Sesco feed unit can be attached to a press to feed right, left, front or back and can be timed to feed-in during any portion of the press cycle. The four legs are adjustable for leveling.

TWIN-CYLINDER HYDRAULIC GRIPPER FEED UNIT—Now available is a twin cylinder hydraulic gripper feed unit which consists of two grippers, each operated by a hydraulic feed cylinder. The cross head cylinders are sequenced so that while one gripper grips the stock and moves it forward, the other gripper is returned for the next feed stroke. The adjustable hydraulic feed cylinders have a two-piece piston mounted in tandem, inside each cylinder. These are designed in such a way that the distance between the two pistons can be changed by turning a stroke adjuster handle mounted on the side of the unit. Positive internal stops assure duplication of the stroke length. Shock absorbers have been incorporated to prevent impact at each end of the cylinder.

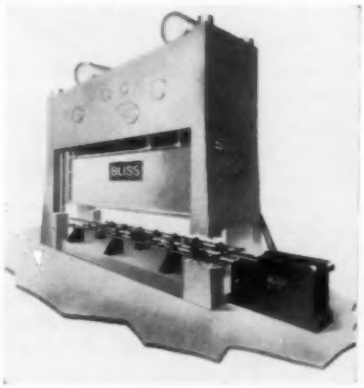
The new unit is available with or without a stock oiler, and is adjustable to receive stock widths from 1 to 10 in. and stock thicknesses to 0.187 in. The length of the feed can be built to a maximum of 36 in.

Circle 131 on postcard for more data

E. W. BLISS CO.

PORTABLE TRANSFER FEED—A self-contained transfer feed console can be used to convert straight side presses to an automatic transfer feed drive operation. It can also be used to move material through a series of presses. Operation is from one power take-off from the press crank, or it may be independently powered and set up to control the press cycle.

The feed stroke is adjustable from 15 to 30 in. in increments of one inch, and the light feed rails can be removed without disturbing die settings. The console is of welded construction, with tapered bearings at all points of support for rotating members, and an overall protective housing.



Bliss portable transfer feed console

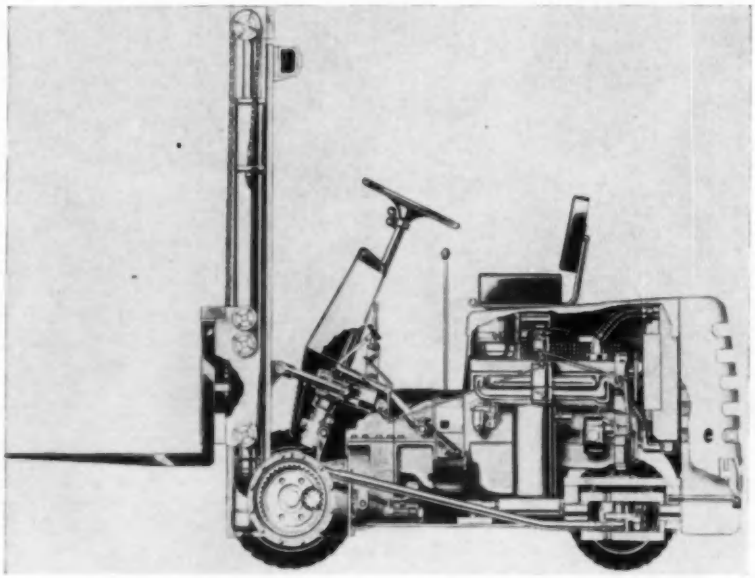
Circle 132 on postcard for more data

PRECISION WELDER & FLEXOPRESS CORP.

HITCH-TYPE PRESS FEED—A press feed arrangement hitch-feeds material at 2200 to 2500 in. per minute, with accuracy to plus or minus 0.002. This permits high speed stamping of parts with long as well as short feed increments. Feed strokes up to 36 in are possible by this new method.

Named Flexofeed, the mechanism is extremely adaptable and flexible in application. It is used in conjunction with a standard high-speed Flexopress, which uses conventional dies. The device incorporates hitch-type feed mechanism actuated by mechanical linkage driven directly from the press.

Circle 133 on postcard for more data



Hyster Space Saver model lift truck is equipped with self-adjusting, oversized brakes

HYSTER CO.

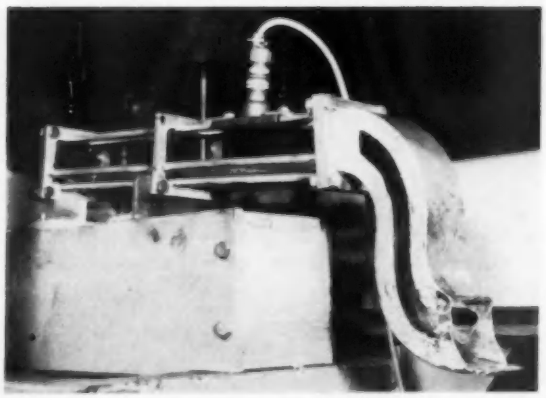
LIFT TRUCK WITH POWER SHIFT DRIVE—A new line of cushion-tired lift trucks designed to perform under exacting space, speed and operating conditions includes 6000, 7000 and 8000 lb capacity models.

Positive control of both inching and braking through the same foot pedal is accomplished through the design of the new transmission, named Power Shift Hystamatic, which is an optional item. Stacking aisle widths are 99½, 101 and 105½ in., for the 60, 70, and 80 models, while the intersecting aisle widths are 71, 73, and 74 in.

The engine is an L-head six, having a 226 cu in. displacement, and is rated at 70 hp at the governed speed.

Circle 134 on postcard for more data

ELECTRO PRODUCTS LABORATORIES



PROXIMITY TRANSDUCER SYSTEMS — Shown here is a set-up in which gears on a conveyor are sensed by the pickup of a proximity transducer system. A motor is energized when the gear is sensed, causing the gear to be moved onto a spindle for a subsequent operation.

Circle 135 on postcard for more data

E. W. BLISS CO.

DIE HANDLING MACHINE—A die handling machine for safely and quickly manipulating dies in the press room or die shop can be used either to turn over a die set or to open a set for maintenance, without danger of damaging the dies.

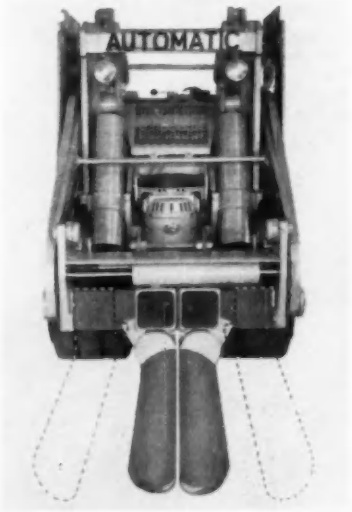
The wheel mounted platens, both with J.I.C. tee slots, are raised and rolled over by the powered screw lift and turnover drive in the housings

To open a die, the top platen is raised over to simulate a press slide. A die set is placed on the other platen and shuttled into position under the top platen. The top platen is then lowered to the die and the top shoe bolted to it. This shoe is then lifted from the bottom shoe and then rolled over. To complete the die opening procedure, the bottom shoe is shuttled out, and the top platen and shoe are returned to the rails and shuttled out.

To turn a set over, the above procedure is followed, then repeated in reverse, with the bottom shoe raised, turned and lowered on the top shoe.

Circle 136 on postcard for more data

AUTOMATIC TRANSPORTATION CO.



A newly designed shifting fork and load carrying ram attachment permits operator to adjust forks hydraulically, individually or simultaneously to meet fork spread requirements. By means of push buttons, the operator can side shift the load 4 inches either side of center or bring forks together at truck's center line to form a load carrying ram.

Circle 137 on postcard for more data

CLEARING MACHINE CORP.

FEED MECHANISM FOR LINES OF SMALL PRESSES—A new feed actuating mechanism named Transflo Feed was designed to transfer small piece parts through a single press or through a line of up to six presses.

This feed can be used with all standard sizes of O.B.I. presses from 45 to 200 tons. It will clear a 37 in. front-to-back part dimension.

Circle 138 on postcard for more data

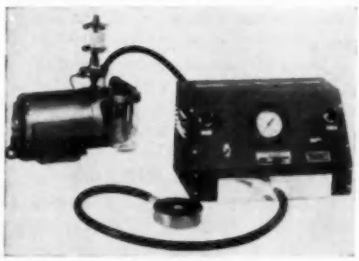
BALANCERS
GAGES
ENGINE TESTERS
HARDNESS TESTERS
ELECTRONIC INSPECTION
MEASURING DEVICES

Quality Control Section

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 139

GITS BROS. MFG. CO.

FLATNESS TESTER — Is designed for determining the degree of flatness or conformity for matching two pieces. Tests to reveal surface fissures, or to gage lapped and ground



Gits Bros. low cost flatness tester

surfaces can also be made. Applications include the testing of individual parts and assemblies, including face type shaft seals, metal seating valves of all types, aircraft parts, magneto parts and "O" ring grooves.

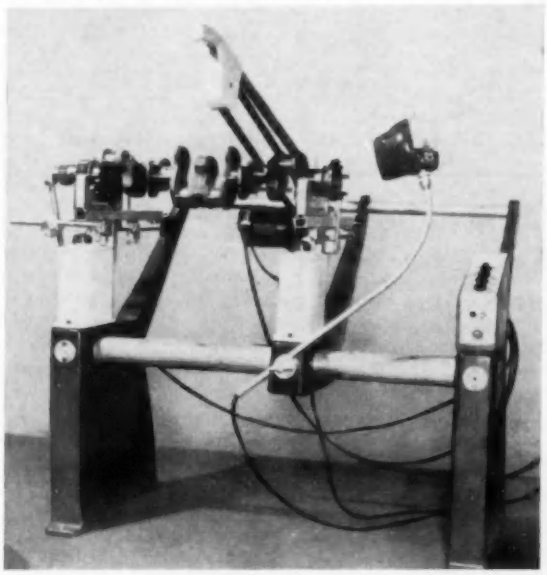
The unit comprises a vacuum pump and instrument panel with an attached testing plate. In most cases, clamping fixtures are not needed since the vacuum pull acts as a sealing force.

Circle 141 on postcard for more data

ALEMITE DIV., STEWART-WARNER CORP.

BALANCER—The balancer illustrated was designed with weight and size ranges for use in engine balancing, quality control, and short-run production. It balances crankshafts kinetically and dynamically at mechanical resonance of the rotor and vibratory system. Designated Model 702, the unit is capable of balancing to 0.004 oz in. all rotating parts weighing between ¼ and 300 lb, with diametral range of from ¼ to 30 in. Features include fast setup, no special tooling required, no critical alignment, and no coupling to drive required.

Circle 142 on postcard for more data



KISTLER INSTRUMENT CORP.

ENGINE ANALYZER — Internal combustion engine pressures, vibrations and ignition voltages can be measured directly by the SLM engine indicator-analyzer, Series EA-114. Utilizing the electrostatic principle, the unit is used to make precision dynamic measurements.

The heart of the system is a Swiss made quartz crystal pressure gage which presents a visual display of engine functions on a standard oscilloscope screen. Cylinder, manifold, fuel injection and detonation pressures, combustion pressure rates, engine vibrations and crankshaft torsional vibration can be alternately shown and measured.

Circle 143 on postcard for more data

Kistler engine indicator-analyzer

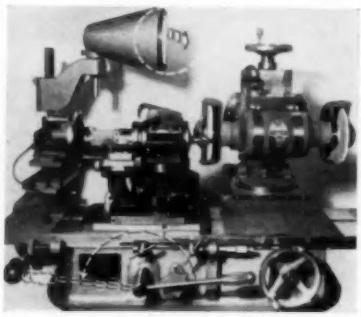
SIMMONDS AEROCESSORIES, INC.

FUEL INJECTION TEST STAND—Designed for the complete testing of a line of fuel injection systems, the test stand pictured is equipped for pre-testing, calibrating and trouble shooting of pumps and injector nozzles. Known as Series 600G, Model S-2, it is a self-contained, electrically powered unit capable of driving pumps under simulated engine conditions of various loads and rotative speeds. Each stand is equipped with fuel flow specification charts so that the output of each pump may be adjusted to match factory calibration standards.

Circle 144 on postcard for more data

ROYAL OAK TOOL & MACHINE CO.

GRINDER ATTACHMENT—The Model RO universal form relieving fixture with optical comparator is an attachment mounted on a bracket attached to the grinder. It swings from an out-of-the-way position, bringing



Royal Oak grinder checking attachment

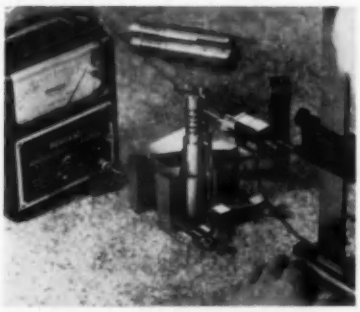
the lens over the work, and projects the ground profile, with 20 to 1 magnification, on the eight-inch diameter ground glass.

This permits checking progress of the grind and comparison with the enlarged template drawn on the glass. The attachment in no way interferes with setup or operation of the equipment.

Circle 147 on postcard for more data

FEDERAL PRODUCTS CORP.

ELECTRONIC MEASURING DEVICE—The basic unit is a small hermetically-sealed gage head. Amplitude of the electronic signal maintains linear relationship to contact movement. The Electro-Probe head, measuring 1½ by 2½ by ½ in., can



Federal electronic measuring device

be used with various types of contacts and contact mountings and can be operated with any one of several types of amplifiers according to application needs. Gage heads are interchangeable and may be employed jointly or in rapid succession by switching.

Designated Model 230P-2, the device includes a light weight portable, battery powered, transistor amplifier plus accessories. Its applications include precision measurement on surface plate or machine and it is suited to general and patrol inspections. The unit is independent of external power and has two ranges available by switching (0.004 in. range at 0.0001 in. grad. or 0.002 in. range at 0.00005 in. grad.)

Circle 145 on postcard for more data

STEEL CITY TESTING MACHINES, INC.

BEND TESTER—The Model GB-121 guided bend testing machine is designed to test butt-welded samples. It is a self-contained unit and has its own hydraulic load applying means.

When testing a given thickness there is no need to remove any of the fixtures between tests, thereby keeping dies in alignment. As the lower die retracts at the conclusion of a test, an ejection device operates to remove the specimen from the lower die.

The tester has a 15,000 lb capacity, and employs a ½-hp motor. Two hydraulic valves control pressure and direction of piston travel.

Circle 146 on postcard for more data

TAFT-PIERCE MFG. CO.

ELECTRONIC GAGE—The Versa-chek is an electronically-operated gage that converts minute dimensional variations to voltage changes

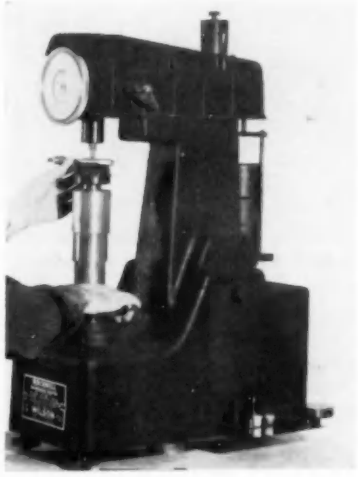
Taft-Pierce electronic gage

and amplifies them to read on a meter. The basic installation consists of an electronic amplifier connected to a pickup head, mounted either on a comparator stand or height gage stand. Gaging is based on a comparison of product dimensions to gage blocks or other suitable masters.

Circle 148 on postcard for more data

WILSON MECHANICAL INSTRUMENT DIV., AMERICAN CHAIN & CABLE CO.

HARDNESS TESTER—The TwinTester was designed for conducting Rockwell and Rockwell superficial hardness testing of materials in tool departments, inspection departments and laboratories. It is capable of performing the measurement of metals and alloys of all types, whether hard



Wilson combination hardness tester

or soft, polished or unpolished, round, flat, tubular or irregular in shape.

The load applying weights consist of a weight hanger which applies a load of 15 kg and five additional weights marked for applying loads of 30, 45, 60, 100 and 150 kg. Fully equipped, the TwinTester is furnished with a cowl, 1/16 steel ball penetrator for B and T scale testing, two each of B, C, N and T scale Rockwell test blocks, plane, spot, shallow V and Cylindron Jr. anvils, dust cover, protective sleeve set and sub-sleeve. For the testing of material which is too soft for the penetrator, ⅛, ¼ and ½ in. steel ball penetrators can be furnished. The unit's vertical capacity is 8, 12 or 16 in. and its throat depth is 5½ in.

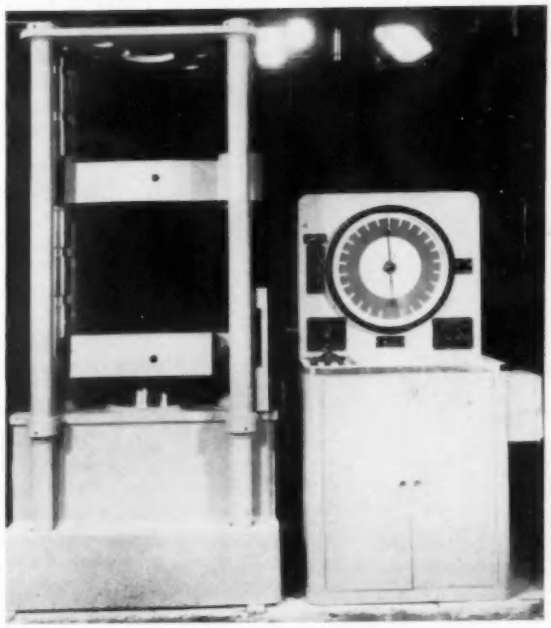
Circle 149 on postcard for more data

THREADWELL TAP & DIE CO.

ELECTRONIC COMPARATOR—Quick process gaging on the machine or at the site of operation can be obtained by use of an electronic comparator consisting of two basic parts: a gaging head with a steel tip that is placed in contact with the workpiece, and an amplifier unit. The amplifier unit records the magnified movement on an easy-to-read dial. The needle repeats its reading in 1/20 sec when used on the same or dimensionally equal parts. Cradling of the hardened steel tip absorbs shock from over and under-sized pieces. Operational pressure never exceeds three ounces. Tips of different materials and contours are available for various applications.

Circle 151 on postcard for more data

BALDWIN-LIMA-HAMILTON CORP.



MECHANICAL TESTING UNIT—Comprised of a testing machine and control stand, this 150,000-lb setup provides facilities for both sustained and alternating loadwork. Load is measured by two SR-4 load cells which transmit signals to the load indicator on the control stand. The cells respond to both tension and compression. Standard testing space is 30 in. wide by 40 in. high.

Circle 150 on postcard for more data

CONSOLIDATED ELECTRODYNAMICS CORP.

SHOCK TESTER — Applications of the HY-6000 device include the shock-testing of components of aircraft, turbines, missiles, rockets, as well as industrial equipment. It simulates shock experienced by equipment in actual use.

High loads are produced instantaneously with thrusts up to 40,000 lb. Shock pulses are controllable for both waveform and acceleration and deceleration level, whether the waveform is square, triangular, cosine or sine plus. The device is essentially a six-inch diameter cylinder containing a piston which is subjected to differential pressures on its two faces. It has two moving parts, the piston and a floating seal.

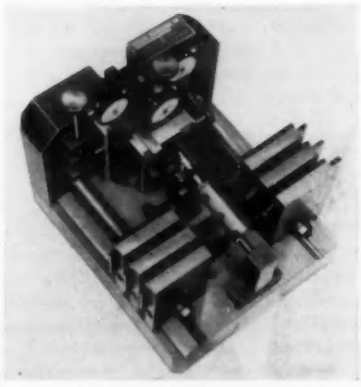
Circle 152 on postcard for more data

SHEPARD & YOUNG TOOL CO.

JET ENGINE BLADE GAGE—Used for checking the accuracy of jet engine blades, a precision gage has airfoil template holders adjustably mounted on its base. The holders are positioned by interchangeable master change bars enabling blades of any length to be checked while maintaining template alignment accuracy.

A jet blade is put in a clamping device where it is located axially from the blade mounting surfaces. The clamping device is swivel and slide-mounted to show blade twist and displacement. The templates engage the foil section of the blade to show form accuracy as well as tilt and bow.

Circle 153 on postcard for more data

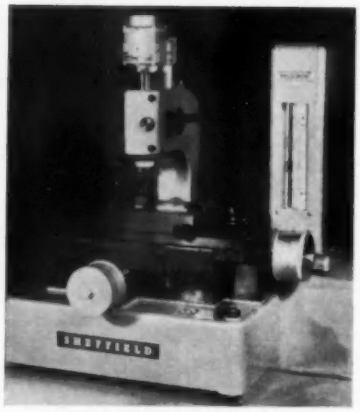


Shepard & Young jet blade gage device

SHEFFIELD CORP.

HOLE LOCATION GAGE—The Precisionaire hole coordinate measuring machine is used to determine the precise location of holes in precision-made parts such as bearing plates, computer and instrument stacks and frames.

The gage consists of a heavy cast



Sheffield hole coordinate measurer

base on which is mounted a serrated work table that is adjustable through both horizontal planes. Above the table is an overhanging arm that has a pickup stylus connected to an instrument which amplifies and indicates gage reading. The four-inch diameter barrel micrometers have one inch gage reading and are graduated in ten millionths.

Circle 154 on postcard for more data

UNIT PROCESS ASSEMBLIES, INC.

COATING GAGE—Right-angle probe permits non-destructive measurements of most coatings and films on the inside diameters of pipes, bores in castings, etc., down to ½ in. ID. Each reading takes two seconds on the electronic instrument, which operates on eddy-current principles. These probes can measure a variety of metallic and non-metallic coatings such as plating, anodizing, paint, plastics, and ceramics.

Circle 155 on postcard for more data

MAGNAFLUX CORP.

HONEYCOMB INSPECTION KIT—A method for checking the bond in honeycomb structures, known as Bondcheck, was developed for use on metallic honeycomb, soldered, welded or brazed to the skin surfaces.

The test procedure begins by cleaning the part and then spraying a specifically formulated red fluid that is repelled by heat and tends to flow to the coolest area on a metal surface. Next, controlled heat is applied from a high-intensity infra-red lamp. This heat is conducted from the surface being inspected to the honeycomb core wherever good bond exists between the core and the surface. Since the visible fluid flows to the coolest areas, it accumulates at every good point of bond, reproducing an exact pattern of the bonded area. Areas of defective bond are visible as gaps in this pattern.

Circle 156 on postcard for more data

GULTON INDUSTRIES

COATING, PLATING GAGE—Thickness measurements of metallic film or foil can be made with a gage known as the Glennite Laminagage. Designed for the non-destructive measurement of the thickness of coatings and platings on base materials, the device will also detect surface and subsurface cracks in smooth and rough castings, flat stock or plate and tubing. The gage is also designed for use in automated process control applications.

Operating on the swept frequency eddy-current principle, the unit will measure coating thickness over the range of 0.00005 to 0.007 in. with an accuracy of 10 per cent. Applications include: crack detection in metals such as cast iron, brass and carbon steel; determining uniform thickness of paints and porcelain enamel coatings; thickness of tin plate, anodized aluminum or tinned surfaces.

Circle 157 on postcard for more data

FEDERAL PRODUCTS CORP.

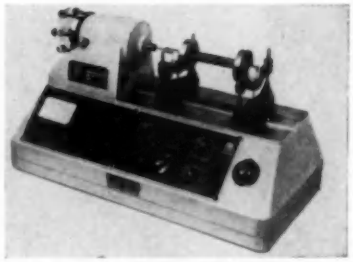
AIR-ELECTRIC MEASURER—Measurement of multiple dimensions can be made by the use of a modular air-electric meter switch named Model EAS-1058. When several of the units are arranged for measuring multiple dimensions simultaneously, they are arranged so that the operator need observe one signal light switch which, when on, indicates that all dimensions are within tolerance.

Each of the individual meter units contained in the gage is equipped with two lights which signal an off-size dimension, red for scrap, yellow for salvage. By glancing at the meter hand, the operator can see how much the off-size dimension deviates from tolerance.

Circle 158 on postcard for more data

TINIUS OLSEN TESTING MACHINE CO.

UNBALANCE DETECTOR — Both angle and amount of unbalance can be indicated by a line of balancing machines designed for production and short run balancing. In operation, the work piece is rotated at speeds up to 3600 rpm by a direct motor drive using a universal joint. The piece is



Tinius Olsen Rova balancing machine

supported by two elastically mounted bearing surfaces which permit free movement of the rotor vertically and horizontally. This allows the part to rotate around its own center of inertia, causing it to act as an eccentric. This motion creates vibrations which increase as the eccentricity increases. These vibrations are transformed into electrical voltages and are compared in amplitude and phase with a standard voltage developed by a sine wave generator. Adjustment of simple electrical controls determines the position and amount of unbalance.

Circle 159 on postcard for more data

THE BUDD CO.

THICKNESS-DENSITY GAGE—Named Gammascan, a thickness or density measuring device for application to continuously-produced materials such as plate and sheet metal, glass and thick sections of plastic, utilizes a modified scintillation process. The process senses the radiation from a sealed gamma radiation source in the detecting unit.

The Gammascan continuously analyzes the thickness of the materials under inspection. An output signal is provided which can be used for control of servo-mechanisms to compensate for indicated variations. It also provides a continuous written record of the thickness of the material, as well as a meter indication.

A modified version can be used as a quality control tool for the detection of small flaws in thick sections of heavy materials.

Circle 160 on postcard for more data

RESISTANCE
SHIELDED ARC
SHIELDED GAS
CONTROLS
BRAZING
WIRE AND RODS

Welding Equipment Section

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 139

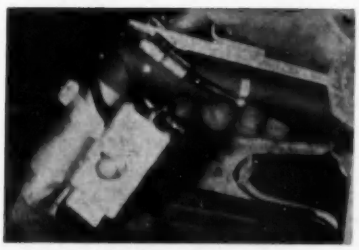
LINDE CO.

WELDING TORCH—An important feature of the Heliarc hand-welding torch, Model HW-18, is that the cooling water passages are molded in the torch head, giving freedom from leakage. The torch body is made of Fiberglas-reinforced phenolic with exceptional heat resistance. Gas cups for the torch have improved thermal shock and heat resistance. For exceptionally hard use, metal sleeved cups are available. The torch weighs 7 oz. Design of the collet bodies gives efficient argon shielding, thereby conserving gas.

Circle 164 on postcard for more data

LINCOLN ELECTRIC CO.

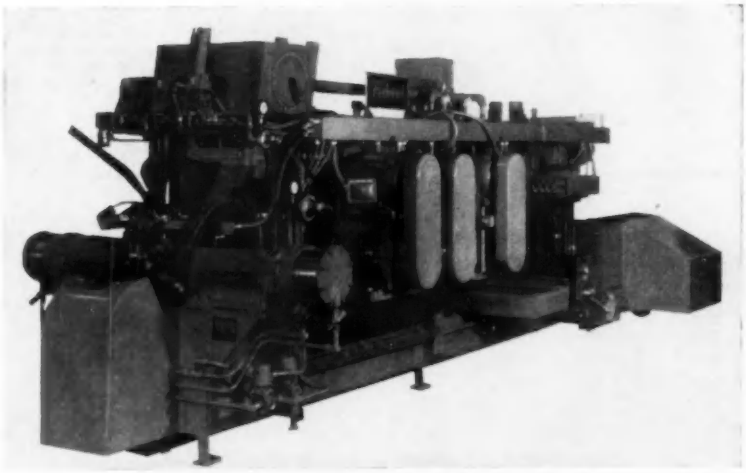
SUBMERGED ARC WELDER—The Lincolnweld ML-3, designed for the submerged arc process, provides automatic wire feed, flux flow and travel speeds, and permits manual guiding of the welding arc. The unit feeds a continuous wire electrode from a coil to a hand-held gun, which is held against the joint along which it is propelled at a preset speed by a small motor. A low pressure air system flows flux from a large tank to the guns. The flux then drops from the gun to cover the arc but does not flow ahead of the arc.



Lincoln ML-3 submerged arc welding unit

Speeds up to 70 ipm using up to 600 amp are possible with this unit. It can be used on materials ranging in thickness from 10 gage up. With the exception of the power source, the machine is self-contained and is readily portable.

Circle 166 on postcard for more data



FEDERAL MACHINE & WELDER CO.

PROJECTION WELDER—The air-operated and motor-driven conveyor-type multi-gun projection welder pictured has 15 stations. It is equipped with magazine and hopper feeds. In processing pedal brackets, the packaged line welds, spot faces, reams, deburrs, and sets six weld bolts at the rate of 775 pieces per hour.

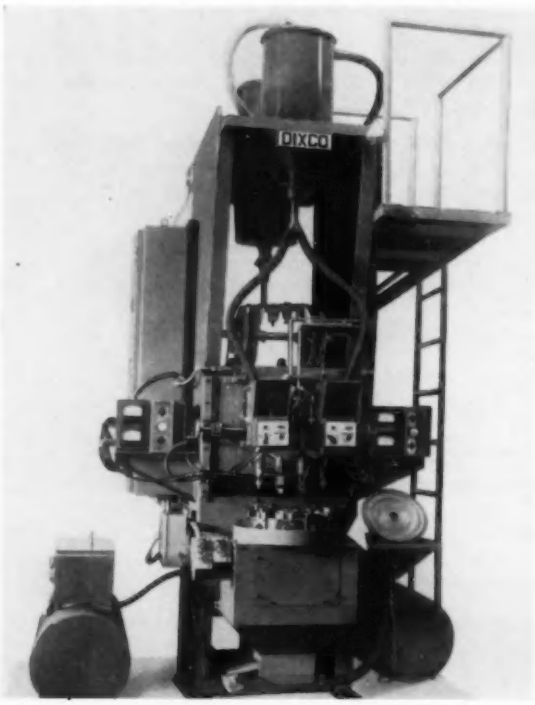
Circle 165 on postcard for more data

WALL COLMONOY CORP.

BRAZING ALLOY—A brazing alloy for high-temperature service has been especially developed for use with large clearances up to 0.050 in. Named W. G. Nicrobraz, the material is recommended for use in non-rotating lightly loaded parts and structural assemblies that have cross-sectional thicknesses of 1/16 in. or greater. It is well suited for applications where large fillets are required.

Circle 167 on postcard for more data

DIX ENGINEERING CO.



SUBMERGED - ARC WELDER—Fully automatic except for loading and unloading, this submerged-arc welder was developed for an operation in the manufacture of automatic transmission parts. The machine, designed to weld two different models of flywheel ring-gear assemblies, completes 10 equally spaced submerged-arc spot-welds in the first assembly 19 sec after the run buttons are pushed. Flipping a selector switch on the control board will cause the machine to join the second assembly with 10 unequally spaced welds. The unit will process 100 per hour of either assembly at 80 per cent efficiency.

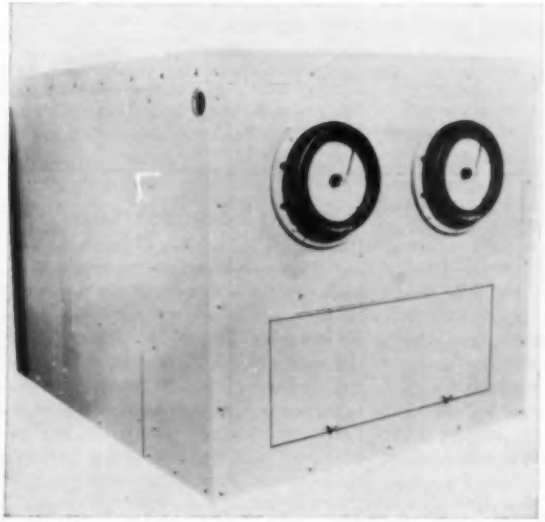
Circle 168 on postcard for more data

A. O. SMITH CORP.

WELDING SYSTEM—This company has developed a single power source system for multi-arc welding. The system makes use of 750 or 1500 amp dc constant-potential power sources in conjunction with series resistance grids to accommodate arc welding, tack welding, stud welding, arc air gouging and inert arc welding.

Depending on the application, the 1500 amp set can be used where 15 to 40 arcs are required. In turn, the 750 amp unit accommodates about half the number of arcs, again depending on the use.

Circle 169 on postcard for more data



A. O. Smith multi-arc welding system developed as a dc power source to supply a multiplicity of arcs through series resistance grids. The units are compact, have silicon rectifiers, and have weatherproof housings made of 16 gage steel. A high current dc bus bar output is provided with four studs, each connection rated at 800 amp. It is thermal protected against overload.

WALL COLMONOY CORP.

SEMI-AUTOMATIC WELDER—A portable welding machine for semi-automatic application of hardfacing wire features a 14 ft flexible shaft for working range from one position. Also a double-range arc length control circuit for operating range and welding control. Plug-in circuit con-

Wall Colmonoy semi-automatic welder

struction is used for simplied maintenance and service.

A remote-control "inch" button, located on the electrode holder, eliminates the need for leaving the work to advance the electrode. The welder operates from any welding machine 300 amp or larger. All power comes from the welding machine. Power source may be ac-dc rectifier, motor-generator, gas drive or constant potential machine. No alterations are required when switching from ac to dc.

Circle 170 on postcard for more data

AIR REDUCTION CO., INC.

STAINLESS ELECTRODES—Three ac-dc stainless steel electrodes, designated as Easyarc 308, 316 and 347, have a coating which contains chromium and nickel in powdered form. Features include: well-formed beads, smooth, uniform operation, and excellent restriking characteristics.

Circle 171 on postcard for more data

AMERICAN BRAZING ALLOYS CO.

BRAZING ALLOY—Available in five diameters bare and four diameters with flux coating, Ambraze No. 111 high tensile nickel silver brazing rod is recommended by its maker for the fabrication of small parts, and the repair of machine tools. It produces a corrosion resistant weld deposit.

Melting point is 1700 F, tensile strength is 80,000 psi and shear strength is 150,000 psi.

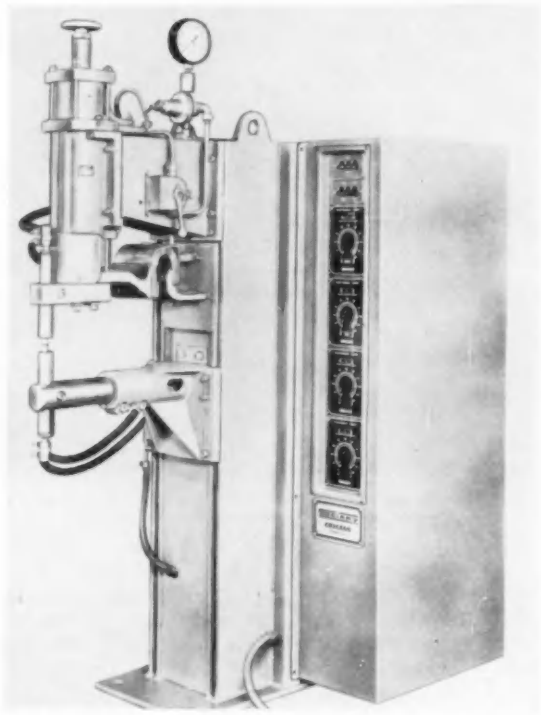
Circle 172 on postcard for more data

SCIAKY BROS., INC.

SPOT WELDER—Designed to cover a wide range of commercial welding operations is a standard, air-operated, press-type, low impedance, single phase spot welder. Available in 30, 50, and 75 kva at 50 per cent duty cycle, it can be furnished with various throat depts. Electrode force up to 1575 lb is provided at 80 psi line pressure.

Features of the machine include a pneumatic, double-acting cylinder head, micro-finish cylinder walls, and molded, synthetic cup seals. A recirculating ball bearing system guided ram is provided to minimize deflection in the guiding ram. A low impedance secondary circuit with all static contact silver plated for increased conductivity, is among other features.

Circle 173 on postcard for more data



Sciaky spot welder, with a side mounted integral control, a fabricated frame with heavy vertical T slotted columns and a fully adjustable, copper alloy lower-arm, covers a wide range of commercial welding operations.

SELAS CORP. OF AMERICA

BRAZING MACHINE—Illustrative of the application of high-speed heating to silver brazing and similar joining operations is the machine pictured. Components are joined using a continuously-rotating dial conveyor. The parts can be brought to temperature in 15 sec by the four gas-fired burners, permitting a production rate of 1800 per hour.

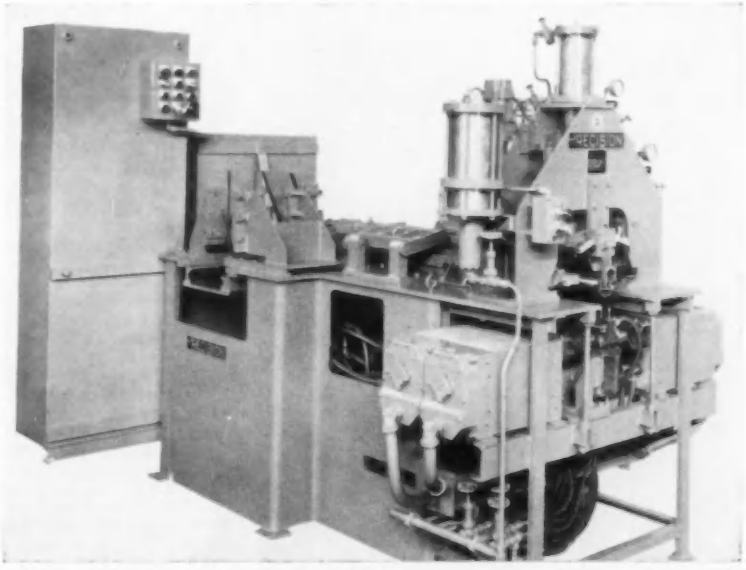
Circle 174 on postcard for more data

KAISER ALUMINUM & CHEMICAL SALES, INC.

WELDING WIRE—King brand bright welding wire, in a broad range of alloys, is for metal inert gas welding processes. The wire is available in one and ten pound spools in diameters ranging from 0.020 to ⅛ in.

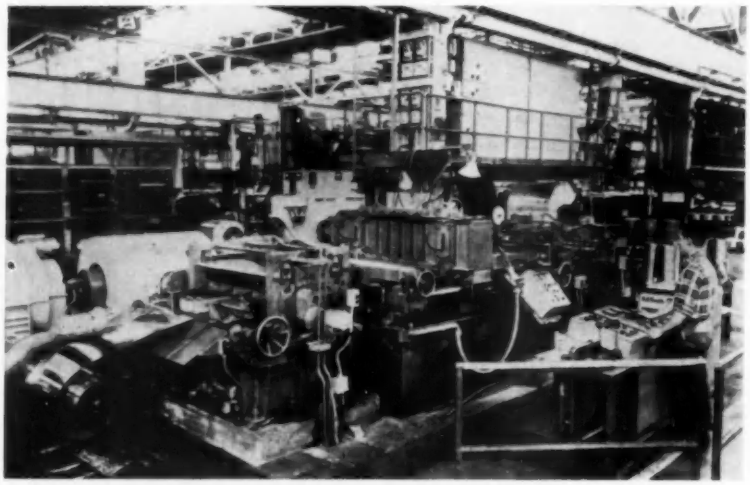
Circle 175 on postcard for more data

PRECISION WELDER & FLEXOPRESS CORP.



PERFORATED TUBE WELDER—Built for making filter tubes for a full-flow oil filter assembly, the perforated tube welder shown has five 43 kva transformers, magazine hopper feed mechanism, forming station, and automatic ejector mechanism. In operation the hopper feeds rectangular stock to a transfer mechanism where it is pre-formed and then roll-formed by high-speed wing-type forming dies around a solid arbor, welded, and then automatically ejected. Ten hydraulic adjustable-mounted guns can handle tube lengths from 2 to 12 in. long, at the rate of 900 to 1200 pieces per hour.

Circle 176 on postcard for more data



Bliss Splice-A-Matic welder builds one 6000 lb coil out of three 2000 lb coils

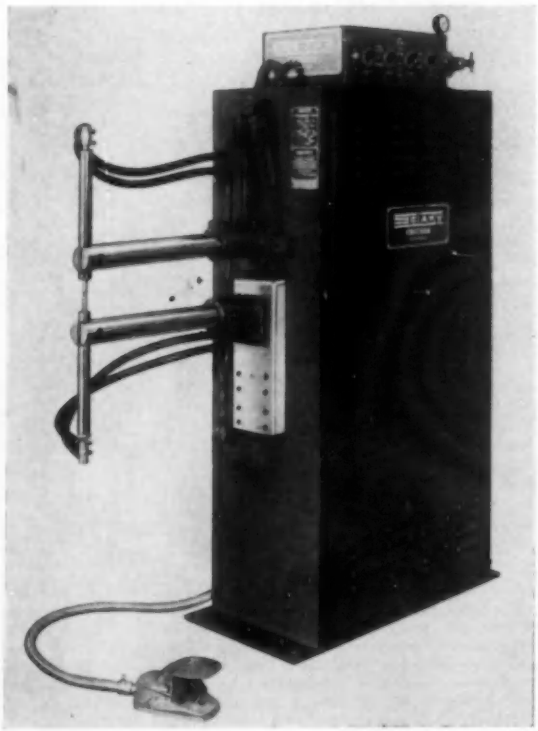
E. W. BLISS CO.

AUTOMATIC WELDER—The welder illustrated automatically splices copper coils. It is used in-line with a leveler, pinch roll stand and side trimmers, and will accept rolls up to 37½ in. wide before trimming. In operation, the tail end of the lead coil is centered, clamped and sheared, after which the end is swung up out of the way and the lead end of the next coil is prepared in the same way.

The entire shear and welding clamp assembly is then moved to the welding position, with the welding clamp securing the sheared, matched joint.

Circle 177 on postcard for more data

SCIAKY BROS., INC.



SPOT WELDER—This single phase SR O rocker arm spot welder was designed for rugged shop conditions. The frame is unusually rigid; control is transistorized with plastic-coated printed circuitry and plug-in components. The units have application in relatively light gage metal fabricating. They are available in standard O size frame, with 30 or 50 KVA transformer. Throat depth can be varied by a choice of six arm lengths ranging from 12 to 42 in.

Circle 178 on postcard for more data

LINCOLN ELECTRIC CO.

WELDING PROCESS—Innershield, an automatic high-speed welding process and equipment, arc welds steel at speeds ranging up to 300 ipm. The process uses a flux-containing, coiled wire electrode that produces a vapor shielding for an open arc.

No fluxing or shielding agents are added to the arc from external sources; all materials are contained in the electrode. Speeds in 14 gage lap welds in the horizontal position range around 150 ipm. Lap welds in heavier material, such as 3/16 in. plate, range around 100 ipm.

Equipment for the process includes a welding head that controls electrode feed and a motor-generator power source that supplies 400 to 1000 amp welding current. The control circuit for the welding head adapts to machines and fixtures for high-volume production welding.

Circle 179 on postcard for more data

HOBART BROS. CO.

INERT GAS WELDER—Gas shielded arc welding equipment, independent of water lines, permits the operator to change welding stations without installing water lines or changing hose connections. The "Circoolator" (water tank with motor driven pump), used in combination with the ac-dc welder, provides an independent water supply for cooling the torch. The tank is 20 gal, rustproofed and baffled. On the removable top plate is a bronze rotary gear pump with shafts of stainless steel coupled to a 1/3 hp motor for operation on single phase, 60 cycles, 110 v.

Circle 180 on postcard for more data

AIR REDUCTION CO., INC.

SHIELDED ARC-WELDER—A manual unit for application of the Aircomatic or inert-gas-shielded arc-welding process provides a new type of wire feeding system to handle wire types and sizes from the finest to the heaviest.

Developed initially for welding aluminum, the process is now being used to cut and spot-weld all commercially weldable metals. Both push and pull guns are available to cover wire types and sizes from 0.020 in. hard to ⅛ in. aluminum. The equipment is portable.

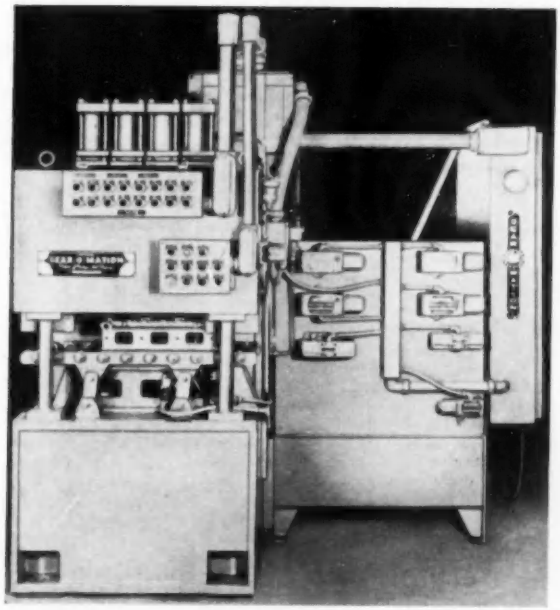
Circle 181 on postcard for more data

COMPONENTS
CONTROLS
ATTACHMENTS
DRIVES
ELECTRIC MOTORS
NUT RUNNERS
PORTABLE TOOLS

Specialized Equipment Section

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 139

MICHIGAN TOOL CO.



VALVE GUIDE FITTING UNIT — This machine is designed to simultaneously press all valve-guide bushings into engine cylinder heads. Hydraulically operated and electrically controlled, the machine fits bushings at a pre-determined force into any one of a family of five different Diesel engine cylinder heads. The heads are for two, three, and four cylinder engines of two types. In-line and V-type. Manually loaded and unloaded, the machine has a fully automatic work cycle. It weighs about 3000 lb and requires a floor space area of 3 by 6 ft. (Gear-O-Mation Div., Michigan Tool Co.)

Circle 182 on postcard for more data

SANBORN CO.

CHANNEL EVENT RECORDERS —Included in a line of channel event recorders designed for recording "On-Off" events are 4, 8, 16, 24 and 32 channel models. The portable units consist of standard recorders used in the Sanborn "150" series oscillographic recording systems, but with a four-style Model 189 Multi-marker in place of each conventional galvanometer.

To supply multi-marker coil power, which is approximately one w per coil, a series of transistor amplifiers is used. Input impedance is 3000 ohms minimum, with two v maximum required to supply multi-marker coil power. This is a class B circuit accepting positive going signals only. Rise time of the amplifier and multi-marker combination is approximately 10 milliseconds.

Circle 183 on postcard for more data

SCOVILL MFG. CO.

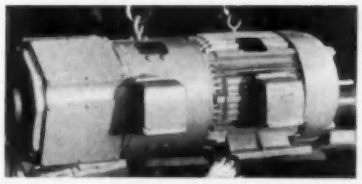
HOSE REEL—Combining tool suspension and air supply, a compact and highly convenient hose reel keeps tools always within reach and saves time on high speed production assemblies. Spring tension of the reel counter-balances the weight of pneumatic drills, screwdrivers and other air tools. A spring motor provides automatic uptake of the suspended tool, and tension can be adjusted.

Circle 184 on postcard for more data

WESTINGHOUSE ELECTRIC CORP.

SPEED DRIVES—A packaged adjustable-speed drive in which an ac and a dc motor and semi-conductor and rectifiers are integrated provides continuously variable speed control over speed ranges of 1½ to 1, 2 to 1, or 3 to 1; maximum speed is 1690 rpm. All power requirements are supplied from normal ac distribution systems.

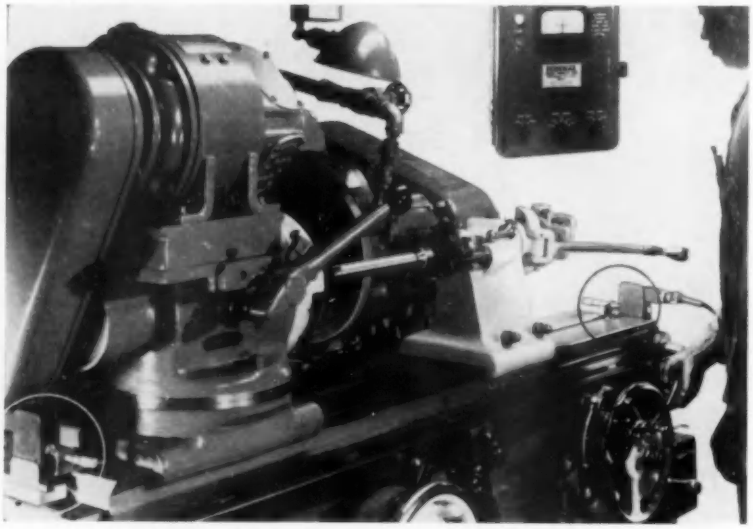
Named Rectiflow, these drives have



Westinghouse Rectiflow adjustable-speed drive

been applied to precision wheel grinders and other applications include machine tools of various types, variable speed pumps and variable frequency m-g sets.

Circle 185 on postcard for more data



Federal, Sure-Set positioning gage for locating universal grinder swivel tables

FEDERAL PRODUCTS CORP.

WORK POSITIONER GAGE—Universal type grinding machine swivel tables can be positioned by use of a new work positioning gage called the Sure-Set. It can be used with any make universal grinder of good capability and on a swivel table of any length.

The device incorporates two completely closed electronic gage heads which locate on the grinder at the ends of the table and work into a special amplifier through a selector switch. Associated with the amplifier is computing circuitry which automatically corrects for the difference between work length and table length.

Circle 186 on postcard for more data

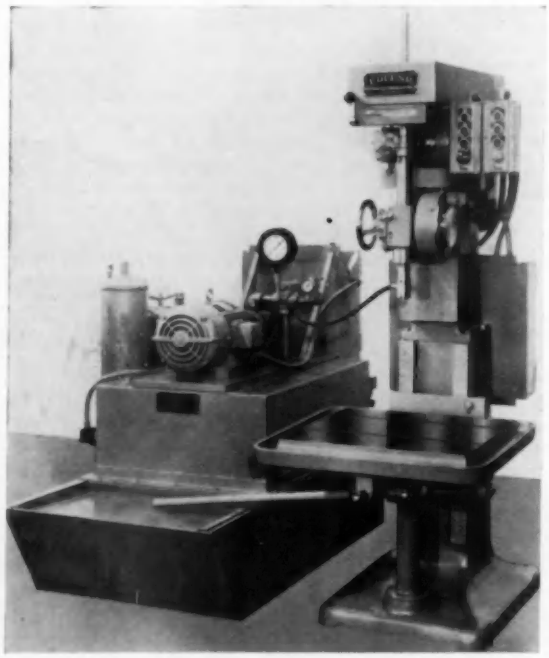
WESTINGHOUSE ELECTRIC CORP.

GEARING EQUIPMENT—A line of helical-gear, speed-reducing apparatus called Moduline features a double-reduction cage with a fixed 5 to 1 set of low-speed gears. Spin-flame, heat-treated, high-speed change gears are mounted on rolled spline shafts so that they can be mounted or replaced with common hand tools.

A total of seven unit sizes are available with ratios of 5 to 1 to 625 to 1. Stock components are the building blocks for gear motors, separate speed reducers and package motor reducers. These components can be assembled into arrangements providing for floor, ceiling, wall or angle mounting. Basic subassemblies and accessories can be combined to make any helical-gear drive configuration.

Circle 188 on postcard for more data

EDLUND MACHINERY CO.

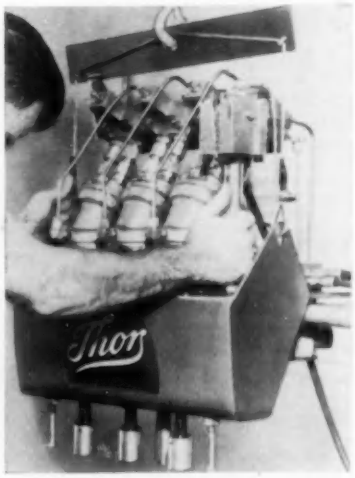


COOLANT SYSTEM—A high - pressure coolant system that can be used with carbide tipped gun drills, Model 2HPC, has a 140 gallon oil capacity and a choice of motors. The 5 hp motor delivers 10 gallons per hour, and the 10 hp delivers 20 gallons per hour. Pressures are adjustable to 1000 psi. The oil return from the drill is collected in a settling tank with a removable strainer. From the tank the oil is pumped by separate low pressure pumps through two replaceable filters that filter as fine as 10 microns. The system measures 70 in. long by 51 in. high by 44 in. wide and it weighs 1525 lb. It can be used with gun drilling machines to provide an efficient drilling unit.

Circle 187 on postcard for more data

THOR POWER TOOL CO.

CONTROL SYSTEM—A completely hydraulic control system designed for multiple nut-setting and other multiple power tool operations delivers uniform torque to plus or minus 1 ft-lb simultaneously to as many threaded fasteners as it is set up to drive.



Thor completely hydraulic control system

Called the Thor-Draulic, the system is designed for multiple setting of as many as 20 fasteners of various sizes and bolt patterns. The machines can be balancer, torque arm, bench or machine mounted, depending upon size and application. Torque is delivered to each threaded fastener by means of two-stage hydraulic driving.

Circle 189 on postcard for more data

ALLIS-CHALMERS MFG. CO.

SPINDLE MOTOR — A direct-current motor which operates at any speed between 50 and 6000 rpm has been developed for use with a new series of three-dimensional milling machines. The variable speed of the motor allows machining of various metals, each at the most desirable speed for maximum work production and cutter life.

The motor is rated at 10 hp, intermittent service at a base speed of 1500 rpm. It delivers constant torque from 50 to 1500 rpm and constant hp from 1500 to 6000 rpm. It is totally-enclosed, liquid cooled. Outside diameter is 13½ in. overall, length is 28 in.

Circle 190 on postcard for more data

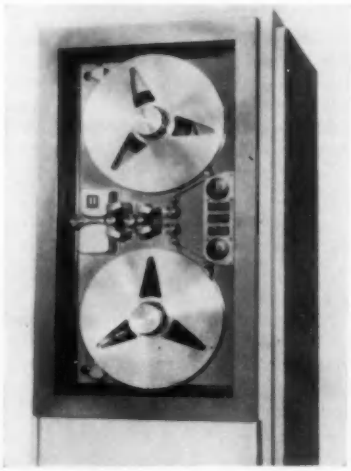
WESSON CO.

BORING QUILLS—A line of special boring quills use throw-away carbide inserts, and each quill is designed to combine operations, such as: boring, facing, spot-facing, counter-boring, and turning.

The outside-cutting inserts can be adjusted both radially and axially. Close tolerances can be held for each cut individually and for the interrelationships between cuts.

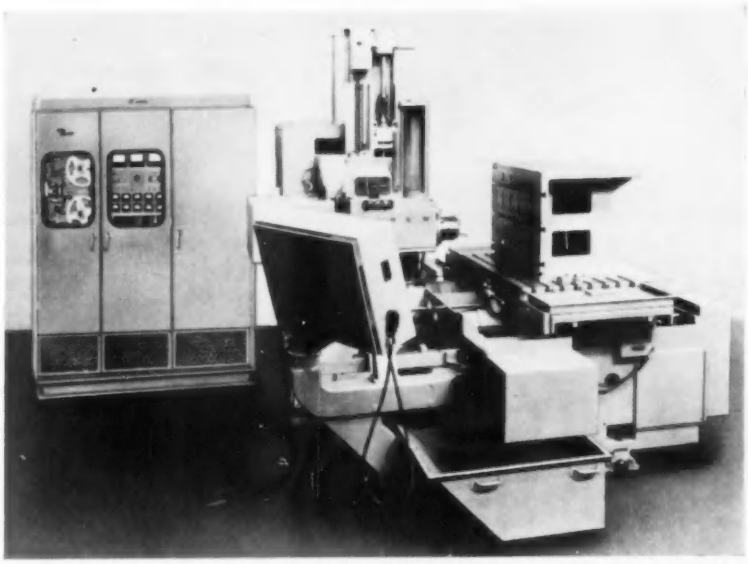
Circle 191 on postcard for more data

MINNEAPOLIS-HONEYWELL REGULATOR CO.



TAPE TRANSPORT—This tape transport has been designed for telemetry and other analog data applications. It permits separate recording, or in combination with direct-reading frequency modulation or pulse-width modulation. It can handle up to 14 in. reels and has 6 tape speeds.

Circle 192 on postcard for more data



Bendix tape control system includes a tape preparation unit and a machine control unit

BENDIX AVIATION CO.

TAPE CONTROL SYSTEM — The Bendix Tape Control System includes a tape preparation unit and a machine control unit that operates a machine tool.

The tape preparation unit consists of a Flex-O-Writer, a computer, an auxiliary magnetic tape storage unit and a control tape punch. The Flex-O-Writer produces the process tape from information contained on a process sheet. The computer converts the process tape part information such as tool center path, feeds, etc., to a punched control tape.

The machine control unit consists of a hydraulic power supply, electronic machine control unit, servo drives and feedback units. The control unit receives, stores, decodes and relays command pulses from the control tape to the servo drives of the machine tool. The feedback units are driven by the machine leadscrew or by precision gear racks on moving members. The difference between the feedback pulses and the number of control pulses is converted to a proportional voltage which controls the hydraulic servo valves which in turn controls rotary piston motors.

Circle 193 on postcard for more data

HUCK MFG. CO.

PORTABLE POWER CELL—This two-pressure hydraulic power cell permits installation of Huckbolt fasteners with maximum interference fit. Designated Series 700, it is to be used with the Huck Model 607 which was made for double-driving applications of commercial or air-craft fasteners.

It is designated with two separate system relief valves. The low pressure circuit is adjustable between 600 and 1800 psi in the standard design. Pressure adjustment is by stem control of the low pressure relief valve setting. The high pressure relief valve setting is fixed at 3000 psi to provide the necessary high working pressure for driving the fasteners.

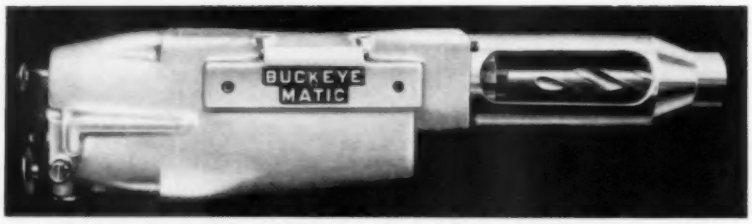
Circle 194 on postcard for more data

OLIN MATHIESON CHEMICAL CORP.

FASTENING TOOL—A powder-actuated fastening tool has been designed to stop an overdriven fastener in its tracks, thus eliminating the danger of firing through a thin work surface.

Control of the fastener is accomplished by an assembly whose tapered interceptor jaws prevent the passage of an overpowered fastener or one that encounters a soft or thin spot in the work surface. The fastener is stopped before it leaves the tool. Named the Flite-Chek, the tool seats a special fastener into a variety of non-brittle material at a pull of the trigger. The tool is capable of sinking a fastener into as much as an inch of steel.

Circle 195 on postcard for more data



Buckeye mechanical feed drill features a completely automatic drilling cycle

BUCKEYE TOOLS CORP.

MECHANICAL FEED DRILL—A mechanical feed automatic drill goes through the complete drilling cycle including retraction and stopping automatically. Designed for applications where drilling is done at several points on a large workpiece, it may also be used with permanent fixtures, where work would be brought to the tool.

Rated capacity is 1½ in. in steel, larger in aluminum and softer materials. Maximum stroke can be adjusted downward by a micrometer screw. An overload relief mechanism automatically starts retraction and shut-off cycle if an obstruction or broken twist drill subjects work spindle to an overload thrust condition.

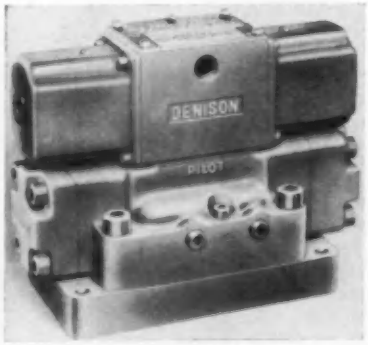
Named the Buckeye-Matic, the unit is adaptable in drilling, reaming, boring, counterboring, countersinking.

Circle 196 on postcard for more data

AMERICAN BRAKE SHOE CO.

HYDRAULIC CONTROLS—A complete line of hydraulic pumps, motors and controls for hydraulic service up to 5000 psi are the type being incorporated in the design and construction of tooling equipment for automatic and semi-automatic production, as well as complete automation.

Shown is the pilot-operated, solenoid-controlled 4-way valve which is



Denison 4-way control valve

designed to provide all porting and positioning arrangements on circuits up to 3000 psi. Capacities are 30 gpm and 5 gpm for the ¾ in. pilot and ¼ in. solenoid valves respectively.

Circle 197 on postcard for more data

PIONEER ALUMINUM INC.

VACUUM CHUCK — A universal vacuum chuck can handle many different sizes and shapes of work. Designated the "Octopus," it has closely set suction grips which hold non-magnetic materials firmly in place for drill press, router, bullard lathe and other milling operations. Any one or any combination of vacuum apertures can be sealed off, confining the gripping area to the work at hand.

Circle 198 on postcard for more data

ALAN WOOD STEEL CO.

STEEL SHELVING—Offering a wide selection of shelving equipment for use in industrial plants, the Penco line includes plain shelving in 240 different size combinations. Also ledge shelving in 735 different sizes. The shelves, constructed of heavy gage steel, are finished in durable oven-baked enamel, electro-statically sprayed over a corrosion-resistant, zinc-iron-phosphate undercoat. Shelves are interchangeable and adjustable on one-in. centers.

Circle 199 on postcard for more data

PROTO TOOL CO.

NON-SLIP WRENCH — Named the Clik-Stop, an automatic wrench requires no adjustment other than turning the knurl. As the knurl is turned, jaw openings are held fast and cannot change position. It is available in five sizes: 4, 6, 8, 10, and 12 in. and is a precision product forged from alloy steel. Each wrench is chrome plated to prevent rust. Handles use an I-beam construction. Absence of a corner lip on the movable jaw allows a square nut to fit flat to the inside jaw.

Circle 200 on postcard for more data

CHICAGO PNEUMATIC TOOL CO.

TORQUE CONVERTER—Heavy bolts and wheel nuts up to 1¼ in. in diameter can be removed or installed with the "Little Giant" reversible air wrench featuring the Vari-Torque power converter. High torque motor output is sustained by the flywheeling action of the striking hammer, providing extra effectiveness to every impact blow. Power losses created by compressing springs or overcoming the drag of centrifugal force are eliminated.

Impact action is controllable so that large and small nuts may be safely

Chicago torque converter air wrench

driven to proper tightness. A 6 in. extension shank provides the reach and clearance required on deep recessed rim designs.

Circle 201 on postcard for more data

HUCK MFG. CO.

POWER PACK—A heavy duty hydaulic power pack for operation of fastener installation tools is designed to operate the Huck Model 146 Hydraulic driving tool. Designated Model 805 the unit is a portable electro-hydraulic generator.

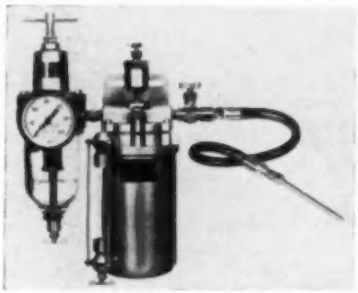
Operating at 3000 psi oil pressure, the new unit is capable of driving the tool at approximately 84 cycles per minute. It is rated at 2 hp at 1800 rpm and operates on 220/440 v, 3 phase, 60 cycle current. The hydraulic pump has a rated delivery of 3 fpm at 1800 rpm operation.

Circle 202 on postcard for more data

C. A. NORGREN CO.

LUBRICATOR—Four Spray-Lube units provide compact installations for the spray application of cutting liquids to lubricate and cool either one or two cutting tools in a wide variety of metal cutting and grinding operations.

A filter-regulator unit removes damaging liquids and solids from the air stream, to prevent contamination



Norgren Model 5821 cutting tool lubricator

of the cutting oil, and accurately controls air pressure in the air and liquid lines. The liquid reservoir, available with either a one or two qt capacity, has an adjusting screw and visible oil flow that permits control of liquid flow.

For dual-point application, the unit has a streamline wye and two lengths of hose. The wye, installed in a downward position, assures equal spray distribution to both outlets.

Circle 203 on postcard for more data

ROSS OPERATING VALVE CO.

PILOT VALVE—Ross Skyline Series valves offer long life and interchangeability of heads and bodies. Pictured is the Silver Model spool solenoid pilot valve, which has a tested life

Ross Silver Model spool pilot valve

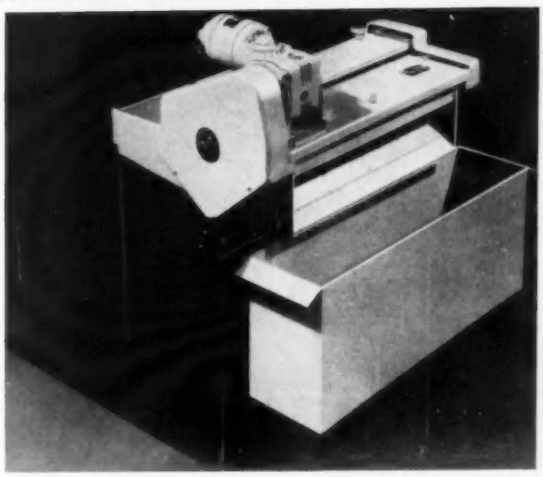
of more than 25 million cycles, mounted on a three-way incline and a four-way base-mounted valve.

Circle 204 on postcard for more data

SUNDSTRAND MACHINE TOOL CO.

COOLANT SEPARATORS — Power-Grip magnetic coolant separators offer automatic coolant cleaning and can be easily installed on many types of grinding, honing and gear-shaving machines. Coolant leaving the machine passes under the solid, permanently charged revolving drum for direct exposure to the magnetic drum without interference from nonmagnetic insulators. Separated material is removed mechanically.

Circle 205 on postcard for more data



WAGNER BROS., INC.

AGENT DISPENSER—A dispenser for adding and metering agents to a plating bath is constructed so that it can be mounted at any spot on the reinforcing angle rim of a plating tank, supported from any suitable position over the tanks by a hook, or remotely mounted with extra long tubing.

The unit is calibrated in pints, and its rate of additive volume to the bath is controlled by an adjustable type pinch clamp around the plastic tubing.

Once the flow rate is regulated, the dispenser need not be disturbed, since a second pinch type clamp makes it possible to shut off the flow.

Circle 206 on postcard for more data

RUSSELL, BURDSALL & WARD BOLT AND NUT CO.

SEALING FASTENER—A secure triple seal may be obtained on irregular, corrugated or curved surfaces as well as flat surfaces by use of a sealing type fastener named the Spin-Seal. The device consists of a spring type hardened washer with a permanent flowed-in gasket sealant which is preassembled to any type of standard machine screw, cap screw or bolt. The seal is not subjected to twisting and tearing action because the washer does not turn when the screw or bolt is tightened. Spin-Seal fasteners are suitable for auto and truck body assembly.

Circle 207 on postcard for more data

GEO. T. SCHMIDT, INC.

MARKING UNIT—For hand-stamp operations that arise at various points in the plant a new mobile marking system designated the Marking Cruiser has been designed. The unit contains all the items necessary for hand stamping. It also provides the working area. Two hammers, a retractable stool, a lamp and a shock absorber pad are included. The font

Schmidt mobile marking unit

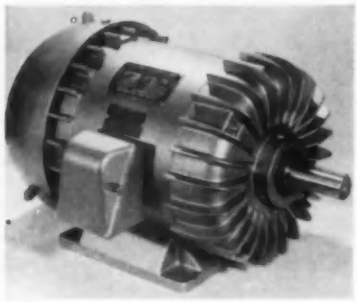
case contains four sizes of hand stamps: 1/16, 3/32, ⅛ and 3/16 in., of 40 characters each. Size of the unit is 24 by 36 by 32 in.

Circle 208 on postcard for more data

A. O. SMITH CORP.

INDUSTRIAL MOTORS—A line of totally enclosed and explosion proof motors, from 1 to 500 hp, has been specifically designed for industrial applications. The motors are available in the new NEMA frames through 365U, old NEMA frames through 505, and standard industrial frames above 505 through 500 hp.

The line features recessed neoprene slingers on the output shaft, a foolproof lubrication system, stainless steel connection and name plates, and



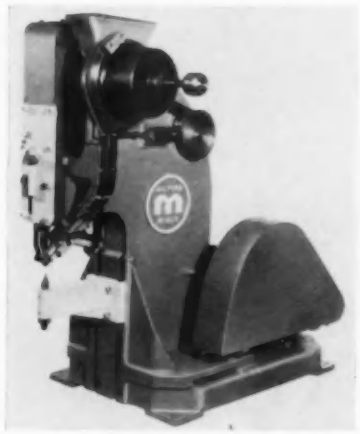
A. O. Smith motor for industrial applications

shock resistant fan covers. All models have indexed leads and a balanced insulation system. Overside conduit boxes are standard.

Circle 209 on postcard for more data

MILFORD RIVET & MACHINE CO.

RIVETING EQUIPMENT—Shown is the Model 54, a single-spindle heavy-duty bench riveter, which is designed to feed and set ⅛ and 5/32 in. diameter semi-tubular rivets from ⅛



Milford Model 54 bench riveter

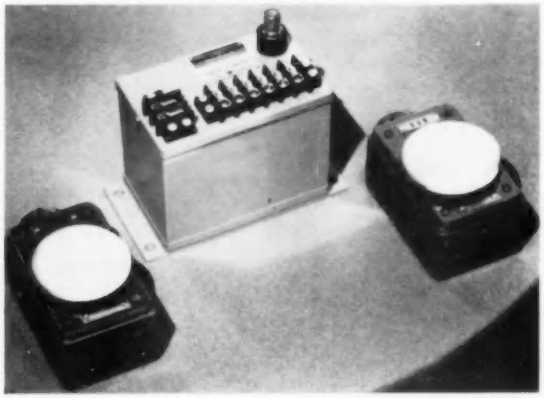
through ¾ in. in length. It is equipped with a quick-change hopper and raceway for conversion from one rivet size to another.

Circle 210 on postcard for more data

SAFETY INTERLOCK —The Cypak static safety interlock, designed for machines with dual manual control, contains no moving parts. The magnetic interlock requires that both control switches be closed together. If either button is released, the machine is stopped and cannot be restarted until both buttons have been released and then depressed anew.

Circle 211 on postcard for more data

WESTINGHOUSE ELECTRIC CORP.



THE ACROMARK CO.

PRINT UNIT—An air powered printing machine applies color to depressed or sunken cavity letters and design, raised panels, faces of raised letters and design, or combinations of both.

Named the Acroprinter Model 401-A, it consists of a cast iron base with a platen type printing machine mounted at average operator feeding height. A gear and rack arrangement, powered by an air cylinder, which is mounted in the back, provides the operating power to apply printing pressure to any product that is properly positioned.

Circle 212 on postcard for more data

VICKERS, INC.

HYDRAULIC PUMP—A variable delivery, variable pressure, hydraulic pump capable of pressures up to 5000 psi is designed to deliver 38.2 gpm at 3750 rpm and 3000 psi. Minimum life for steady state operation at this pressure and flow is approximately 1335 hours. At 5000 psi and 3750 rpm, delivery is about 38.2 gp with minimum life of approximately 288 hours. Handwheels provide ready manual adjustment of maximum pump delivery and maximum load pressure.

Circle 213 on postcard for more data

RELIANCE ELECTRIC AND ENGINEERING CO.

A-C MOTORS—Series "D" a-c motors in NEMA frame 364U through 445U come in foot-mounted and footless horizontal models in the 360 frame diam. They operate on 208 through 550 v in-plant a-c. Made in NEMA electrical design B, C, and D the large-frame motors may be specified in many speeds with Class A, Class B or high temperature Class H insulation. Part-winding starting is available.

Circle 214 on postcard for more data

GENERAL ELECTRIC CO.

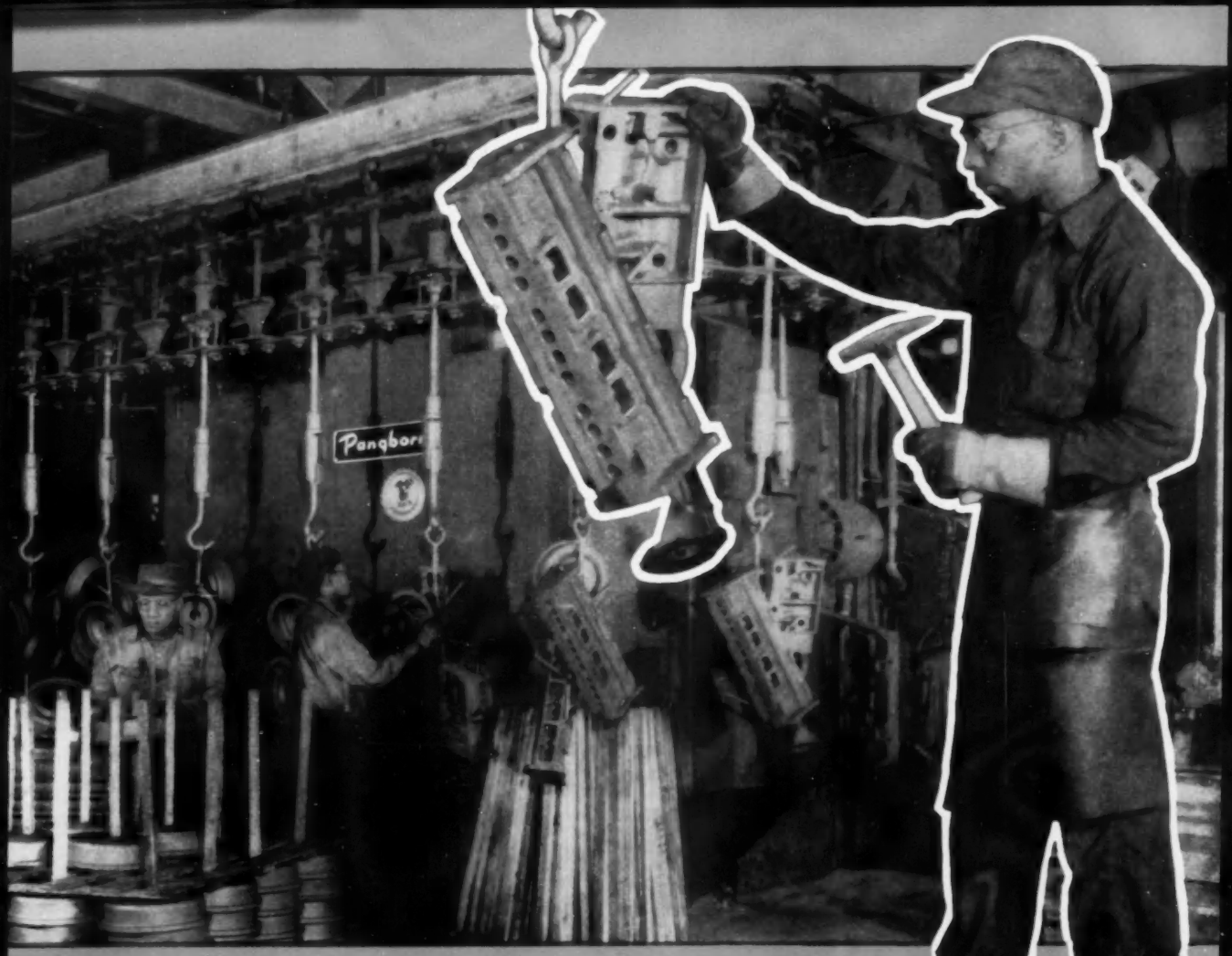
FRACTIONAL HP MOTORS—A line of fractional hp motors feature plug-in quick-connects for all terminals, quick change of rotation, and brass links that simplify voltage change on dual-voltage motors. An

General Electric Form G motor

enlarged wiring compartment and a narrow terminal board permit fast hookups during installation.

Circle 215 on postcard for more data

(*Turn to page* 144, *please*)



Pangborn Blast Cleaning Cabinet

blast cleans 40 to 50 tons per day at General Metals new foundry

The big $5 million foundry at General Metals Corp. in Oakland, Calif., boasts the latest, most efficient equipment for producing castings—from the molding to the finished piece.

Speeding production in the blast cleaning department is the Pangborn Monorail Cabinet shown above and two other Pangborn machines. This cabinet has handled as many as 3,500 large, individual castings a day—such miscellaneous pieces as brake drums, fuel injector pumps, valve housings, truck hubs, etc.—and cleans between 80,000 and 100,000 pounds of castings per 8-hour shift!

Thanks to Pangborn Rotoblast® cleaning action, Pangborn machines are speeding production in foundries throughout the country. That's because they clean quickly and thoroughly. They require less maintenance, less manpower. The result is *lowest cost per ton of castings cleaned*. Find out what Rotoblast can do for you. Write for Bulletin 227 to PANGBORN CORPORATION, 3900 Pangborn Blvd., Hagerstown, Md.

Pangborn blast cleans cheaper

News of the MACHINERY INDUSTRIES

By Charles A. Weinert

Latest Developments in Numerical Control, Static Switching, Guided Missiles, Etc., to Be Discussed at Annual Machine Tool Conference of the AIEE

Machine Tool Conference Scheduled by AIEE

The American Institute of Electrical Engineers has slated its 10th Annual Machine Tool Conference for October 13-15. Meeting place will be the Statler Hilton Hotel in Hartford, Conn.

On the program are presentations by leading engineers in the industry who will discuss latest product developments, as well as operating experiences with modern machine tool equipment. Subjects will include tooling for guided missiles, numerical control, static switching, tubes versus transistors in machine tool control, computers, gaging, rectifiers, and servo drives, among others.

Arrangements have also been made for tours of several plants in the area. Companies to be visited are: Pratt & Whitney Aircraft Corp.; New England Machine & Tool Co.; New Britain Machine Co.; Arrow-Hart & Hegeman; and New Departure Div., General Motors Corp.

NMTBA Motion Picture Now Being Produced

A. V. Bodine, president of the National Machine Tool Builders' Association, reports that a motion picture designed to tell the story of machine tools to the general public is now in production. The association has signed a contract with Reid H. Ray Film Industries, Inc., for production of the film.

Its purpose is purely educational. It will portray the nature and function of machine tools and their relationship to the standard of living and national defense, explaining interchangeability of parts and quantity production.

The film will be entitled "One Hoe for Makwanga." Makwanga is a tiny village in the heart of Africa, where it takes a whole day to make a single hoe by the primitive methods still being employed. The action will open with actual scenes taken in Makwanga by the producer's photographers. The contrast between Makwanga and present-day America points up the story.

The film is expected to be made available to schools, church and fraternal groups, service clubs, employe meetings, etc., early in 1959.

Capital Expenditures Lacking in Volume

Although the business picture has brightened considerably in the past few weeks, there is still this dark cloud on the horizon: spending for new plant and equipment has not picked up.

Washington experts warn that total recovery from the recession cannot come about until capital investment shows definite signs of resurgence.

Spending for new equipment dropped from an annual rate of nearly $38 billion a year last summer to $31.4 billion in the second quarter of this year. This is a sizable drop, and there are no signs that industrial management is planning to step up its spending for new and better plants. In fact, some Government economists suspect that total spending for new plant and equipment this year will total not more than $31 billion.

Unless — and until — there's a significant pickup in this form of spending, full recovery from the recession will remain out of reach, the Government business experts say.

Around the Industry

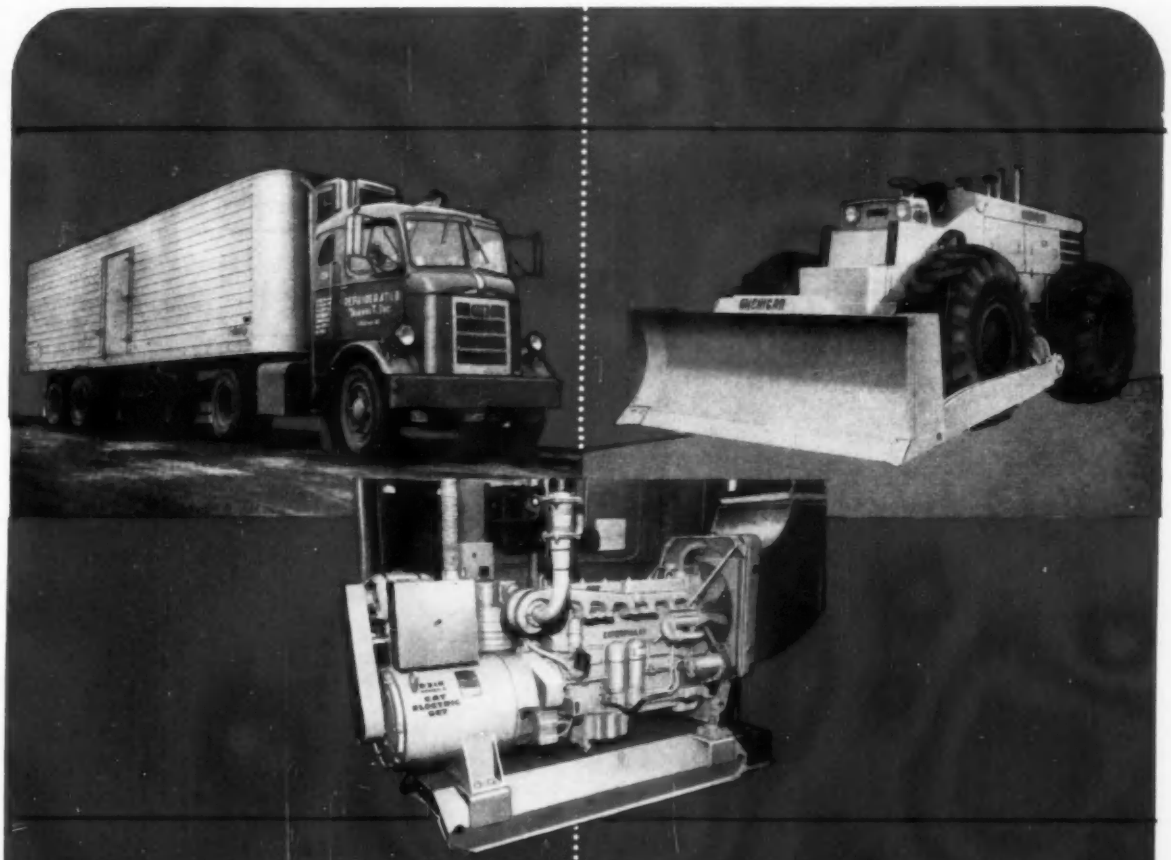
Gisholt Machine Co. is exclusive U. S. distributor of CRI-DAN single-point threading machines, having recently obtained the distribution rights.

Monarch Machine Tool Co. net earnings for the first half of 1958, after taxes and other charges, were $142,717 on shipments of $4,715,-274, or 34 cents per share. Comparable figures for last year were $678,485 net on shipments of $9,-042,779, or $1.61 per share.

National Tool Co., manufacturers of gear-cutting tools, has acquired Auto-Vac Co. of Bridgeport, Conn., makers of automatic machines for vacuum-forming plastic sheets. E. Bowman Stratton, Jr., former president of Auto-Vac Co., has become a vice president of National Tool Co. in charge of Auto-Vac Div.

Kearney & Trecker Corp. has inaugurated a series of one-week workshop sessions for industrial engineers, to demonstrate the operation and economies of the company's new tape-controlled transfer line concept of automation. Economical short-run production is a featured item. Company officials say that while future workshops will be largely by invitation, requests to attend will be welcomed.

ASTE has announced the publication of six research reports by well-known research scientists on various factors affecting metalcutting. Subjects are machinability testing, the mechanism of chip formation, some thermal and physical aspects of cutting, present knowledge of cutting fluids, influence of metallurgical properties on metalcutting operations, and what is known today about metal cutting. For further information, contact Leslie S. Fletcher, ASTE Research Fund Director, 10700 Puritan Ave., Detroit 38, Mich.



You find Schwitzer Turbos where the world's work is done

SCHWITZER
CORPORATION
INDIANAPOLIS, INDIANA

PRODUCTS WITH A NEW APPROACH

- Turbochargers
- Superchargers
- Fan Blades
- Fan Drives
- Accessory Drives
- Vibration Dampers
- Air Starting Motors
- Water Pumps
- Oil Pumps
- Shaft Seals

METALS

Orders for Steel Increasing Despite Higher Prices Averaging About $4¼ to $4½ per Ton for Most Grades

By William F. Boericke

Tempo Quickens on Steel Orders

The moderate price increase in steel has not slowed up buying by customers who had done little hedging to anticipate a price increase. Hence new business has been coming in normally at an increasing rate, stimulated by customer requirements and a seeming end of inventory cutting. The 3 to 3½ per cent hike in steel prices, averaging $4¼ to $4½ a ton, was less than had been forecast. By mid-August it had been applied by almost all major producers on carbon steel and low alloy steel products representing close to 90 per cent of tonnage but less than 90 per cent of value.

Exceptions are noted to the price rise. No action was taken on rails, wire products, tin plate and stainless steel although these products may follow the trend in due course. For rails the explanation was easy —the railroads didn't have the money to buy. Rail orders are said to be the lowest in over 80 years. For wire products, especially nails and barbed wire, imports from Western Europe made the situation so competitive that any price increase would have been hazardous. Tin plate is in a special position. While demand continues to be one of the strongest factors in the steel picture, the tin mills are committed to announce any price rise 35 days before it goes into effect. Hence buyers are not obliged to hedge and the established price is expected to hold through the completion of the canning season by September 30.

Stainless Situation Confused

The stainless steel picture is confused. U. S. Steel, instead of boosting the price, announced a reduction of 6 per cent in mill base price on stainless plates. The company explained this surprising action as dictated by competitive conditions. However, plate represents only 5 per cent of total stainless shipments and it may not apply to other stainless products. Crucible Steel advanced quotations for tool steel two to five per cent for various grades. On the other hand, La Salle Steel will hold the price line on its specialty steel bars although the cost of materials has advanced substantially. In general, the impact of higher prices on the market is difficult to appraise accurately as consumers have hardly had time to assess what it will mean to them in higher costs. While most fabricators will try to pass on such costs, competition for business is so keen as to make this difficult in most cases.

Laggard Buying From Detroit

Automobile buying by mid-August has been slower than expected. While there are indications that demand will improve later and through September, it is likely Detroit is going to be slow in building up inventories until the contract situation with UAW is finally settled. Yet Detroit buyers are in a preferred position today as they were enjoying a $2 per ton price advantage before the hike, hence the advance costs them only half as much as what prevails generally in the industry.

After advancing briskly, prices of steel scrap have softened in most steel centers about $3 a ton with buying termed slow at $42 for heavy melting scrap. Iron ore movement on the Great Lakes has been only 50 per cent of the 1957 rate, with heavy inventories at the mills and loading docks. Demand for off grade steel has been strong as fabricators strive to reduce metal costs. Prices run 15-25 per cent below Grade A warehouse steel.

Zinc Figures Improve

Zinc producers derived some satisfaction from the latest statistics of the Zinc Institute. These showed a balance being gradually achieved between demand and supply. July deliveries to domestic users were the best of the year, increasing to over 60,100 tons, all the more noteworthy because July is traditionally a dull month for the metal trade. Undoubtedly it reflected the pick-up in the steel operating rate. At the same time there was a further reduction in the production of slab zinc by the smelters, which dropped to 65,119 tons for the month, the lowest output since 1957. Nevertheless, the additional cutback was still insufficient to prevent stocks from increasing again, which has occurred with distressing regularity since January. They now total nearly 258,000 tons, or over four months' supply at present rate of shipments, and represent the highest total since 1946.

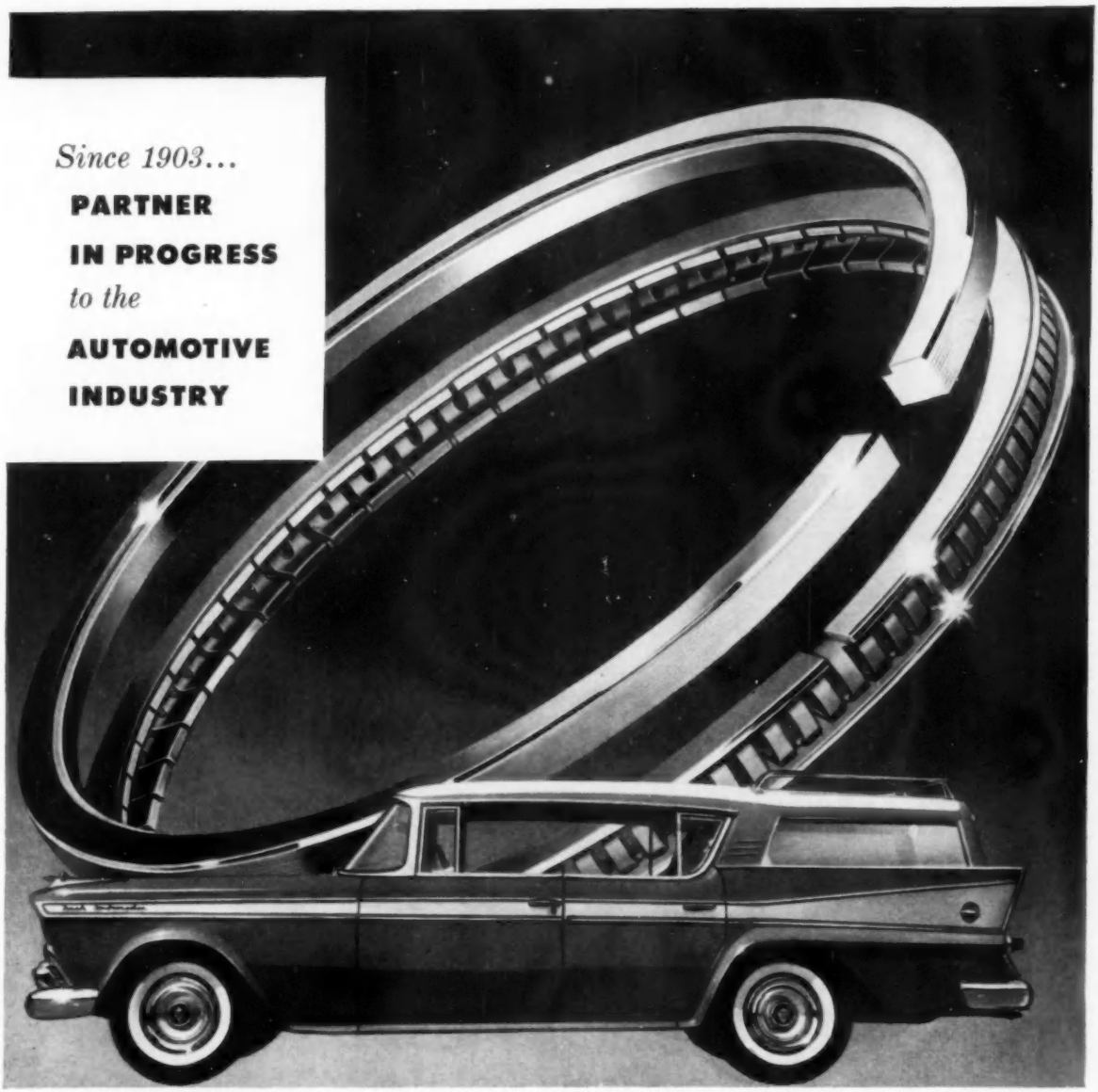
Consumer Stocks at Low Level

Nevertheless, according to the Bureau of Mines, stocks of zinc at the plants of consumers remain at a record low figure, approximately

(*Turn to page* 162, *please*)

Since 1903...

PARTNER
IN PROGRESS
to the
AUTOMOTIVE
INDUSTRY



AMBASSADOR—One of the many outstanding motor cars using Perfect Circle piston rings for both original equipment and replacement service.

Behind the world-wide preference for Perfect Circle piston rings is a history of more than half a century of PC engineering leadership—and more. There's a history, too, of unceasing creative research...a constant search for the new and the better...matchless manufacturing skills...and scores of contributions to the forward march of the automotive industry, year after year. Whenever you have a problem concerning piston rings or related engine components, you are invited to call upon our engineering and research facilities. Perfect Circle Corporation, Hagerstown, Indiana; The Perfect Circle Co., Ltd., Don Mills, Ontario, Canada.

PERFECT CIRCLE PISTON RINGS

AUTOMATION NEWS REPORT

AUTOMATIC CONTROLS

PRODUCTION—VEHICLES—AIRCRAFT

By Samuel Cummings

ACCELERATION TESTING

A 32-ft diameter centrifuge is being used to test missile guidance systems and components in the Western Electric Laboratory at Winston-Salem, N. C. The system can reach acceleration of 100 G's with test loads of 150 lb.

The centrifuge is driven by a 40-hp constant speed a-c motor mounted below floor level. A water-cooled hydraulic clutch—electrically controlled from the operator's station — provides for convenient speed adjustments and magnetic braking is used to stop the system in case of emergency.

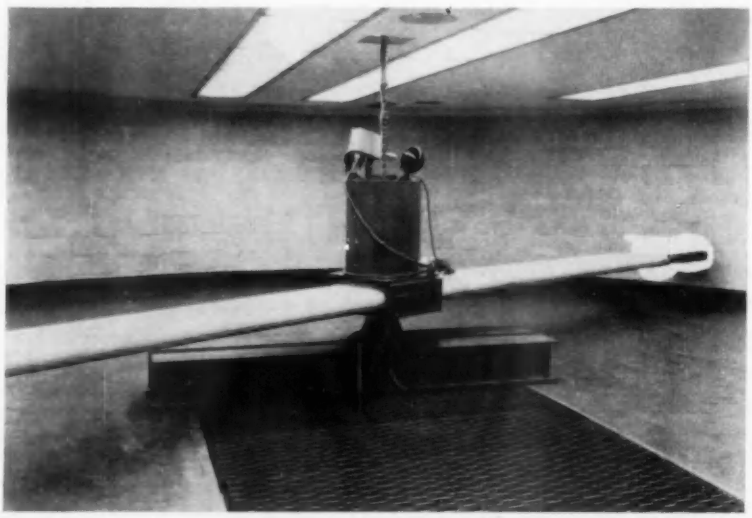
SR-4 strain gages are used to detect any unbalance in the centrifuge supporting structure. The gages, mounted on two I-beams that form the centrifuge support, convert mechanical strains into electrical signals, which are transmitted to an oscilloscope monitor at the control station. When a spot on the oscilloscope screen swings beyond normal limits—indicating excessive strain or unbalance — the centrifuge is stopped and the condition is corrected.

The centrifuge is monitored also by a closed-circuit television system, which includes a ceiling-mounted camera with a wide angle lens to view the entire room and a camera mounted on the center of the boom to view the part undergoing test.

Slip rings and rotary joints at the center of the boom feed high and low frequency signals to and from the unit under test, carry power to spotlights directed at the test unit, and pass power and signals to and from the television camera mounted on the centrifuge.

The centrifuge is installed in a 34-ft (inside diameter) steel-reinforced, concrete - block room. Added safety features include a sand-bagged roof and two safety interlocked doors.

The system was designed and built by Western Electric engineers along the lines of a similar unit in operation at the U. S. Bureau of Standards.



High-acceleration testing of missile guidance systems and components is being done on this 32-ft diameter centrifuge. Missile unit, mounted on end of boom (far right) for testing, has been blanked out because it is classified.

AUTOMATED TREADMILL

Test cars used to evaluate experimental motor fuels and lubricants at the Esso Research Center can now be operated—without drivers—on an automated treadmill.

One man stationed in a control house can "drive" up to eight cars at one time, freeing experienced test car drivers for more specialized road testing programs.

Magnetic tape recordings, made during on-the-road runs, control the acceleration and braking of the test cars in exactly the same way that a motorist would start, accelerate, slow down, and stop his car in normal driving.

To enable test cars to "travel" while standing still, a unique method is used to absorb the engine's power output. The vehicle's rear wheels ride on and rotate wide steel drums, which are belted to "inertia disks" and large fans. The disks, which absorb the power an automobile would normally use to accelerate its weight along a road, are adjustable and can be set to correspond with the road weight of any car. The fans take up the power a car would ordinarily expend in overcoming wind resistance on the open road.

(*Turn to page* 156, *please*)

ARISTOLOY
TURNED GROUND AND POLISHED ALLOY BARS

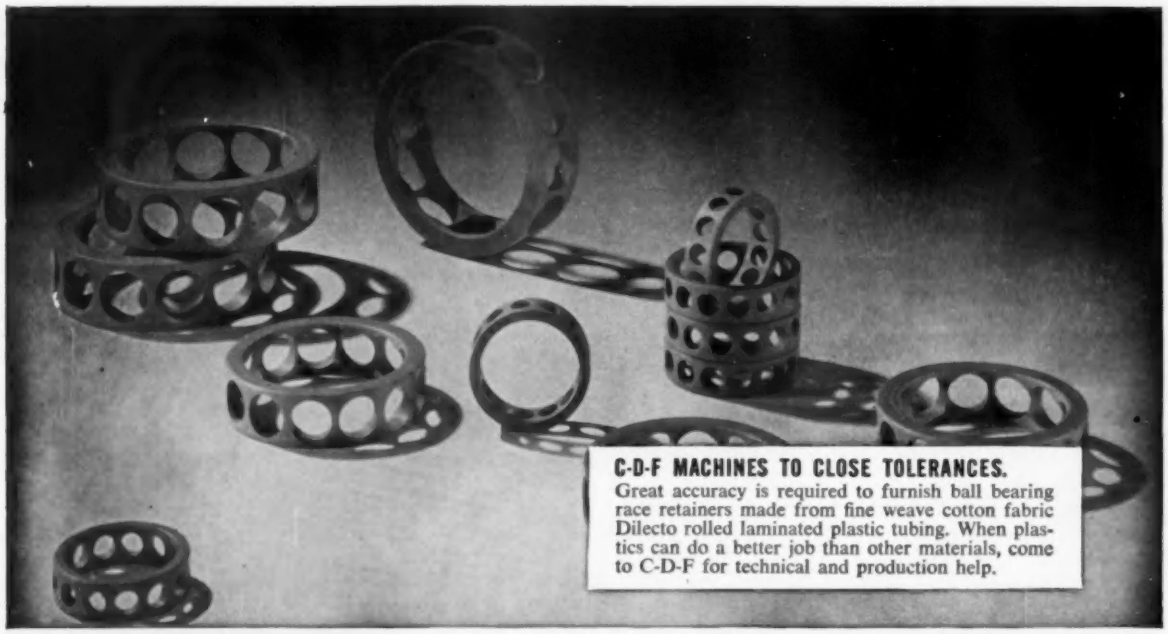
Complete information about Aristoloy electric furnace steels available as billets, blooms and bars. Write today.

ARISTOLOY STEELS

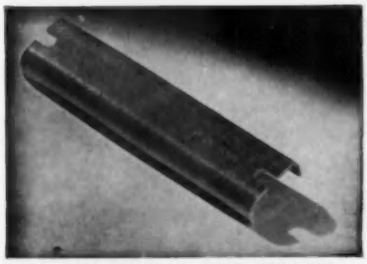
These precision products combine close size tolerances with good surface finish and freedom from surface defects. They can often be used with little or no additional finishing. Available $^{11}/_{16}$" to 4" round in a full range of A.I.S.I. standard analyses, as well as carbon, leaded carbon and alloy, or stainless.

COPPERWELD STEEL COMPANY • *ARISTOLOY STEEL DIVISION*

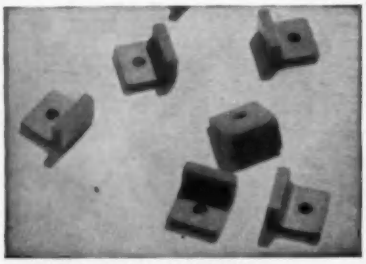
4026 Mahoning Ave. • Warren, Ohio • *EXPORT: Copperweld Steel International Co., 225 Broadway, New York 7, N. Y.*



C-D-F MACHINES TO CLOSE TOLERANCES. Great accuracy is required to furnish ball bearing race retainers made from fine weave cotton fabric Dilecto rolled laminated plastic tubing. When plastics can do a better job than other materials, come to C-D-F for technical and production help.



C-D-F PIONEERED IN POST-FORMING of laminated plastics. This technique gives you stronger, more versatile insulating parts with lower costs. This aircraft channel strip is an example of simple post-forming.



C-D-F DOES THE UNUSUAL. These rubbing blocks are made from fine-weave cotton cloth Dilecto molded *tubing* that has been pierced and cut. The part gains in mechanical strength — the product gets longer service life.

C-D-F SPECIALIZES IN AUTOMATIC SCREW MACHINING of plastic components. These breaker arm bushings are made from Dilecto paper base rolled tubing on high speed machines by men who know and use cost saving methods.

Yes, C D F is a big reliable source for fabricated plastics!

C-D-F SERVES MANY INDUSTRIES with fabricated specialties. A great amount is concentrated in the automotive and allied fields. This aircraft part has a corrugated surface on a strong woven asbestos laminated base.

C-D-F IS A PUNCHING SPECIALIST on these starter solenoid insulators. This is XX-26 Dilecto molded channel strip, pierced and punched to length. Special C-D-F punching grades give you lower costs, faster assembly, fewer rejects.

C-D-F COMES UP WITH THE ANSWERS to insulating problems. These unique snap-in grommets are easy to insert, spring out and hold tight. Write for samples. The chances are that C-D-F is already making the answer to your problem.

See our general catalog in Sweet's Design File for more technical data, the address and telephone number of your nearest C-D-F sales engineer. Also, write for detailed information, samples, or send us your print for quotation.

C D F

CONTINENTAL-DIAMOND FIBRE

A SUBSIDIARY OF THE Burkl COMPANY • NEWARK 2, DEL.

A New Lucas Lathe

Fully-automatic Tape Control, Tracer Control or both. Infinitely variable speeds and feeds. Automatically-maintained, constant-cutting speeds on changing diameters. Console control from moving operator's platform. *Three* hardened and ground ways. Self-contained Motor Generator Set.

The Lucas Lathe — perfect for your large, lightweight, close tolerance, intricately-shaped problem jobs. Lucas Machine Division, The New Britain Machine Company, 12302 Kirby Avenue, Cleveland 8, Ohio.

LUCAS
OF
CLEVELAND

Lucas Tape and Tracer Control

Lucas Tape and Tracer-Controlled Machines offer the advantage of maximum flexibility of operation to suit changing job requirements. All models can perform:

- pendant-controlled boring, drilling and milling
- Numerical Positioning Control, automatic cycle boring, drilling and milling
- pendant-operated contour tracing
- tape-controlled, automatic cycle contouring

These features include punched tape or magnetic tape controlling: head, table, saddle, horizontal rotary table, vertical rotary table and spindle speeds. For tool room work — for precision production, only Lucas Tape and Tracer Control offers so much flexibility in one machine. Lucas Machine Division, The New Britain Machine Company, 12302 Kirby Avenue, Cleveland 8, Ohio.

LUCAS
OF
CLEVELAND

Free INFORMATION SERVICE

Use either of these postcards for Free Literature listed below, or for more information on New Production Equipment and New Products described in this issue.

USE THIS POSTCARD

FREE LITERATURE

Fasteners 1

A 16 page booklet, "Helpful Hints," contains technical facts to help users to obtain maximum economy and performance in the application of standard fasteners. *Russel, Burdsall & Ward Bolt and Nut Co.*

Flow Regulator 2

Waterman Eng. Co. has published 16 page Catalog 1000 which covers their line of pressure-compensated flow regulators for hydraulic power systems.

Turbine Flowmeter 3

A propeller type meter that translates liquid velocity into a millivolt signal proportional to flow rate is described in Spec Sheet 10C1505. *Fisher & Porter Co.*

Wire Cutter-Stripper 4

Jennings Machine Corp. has published a bulletin describing their wire cutting and stripping machine. Production rates versus wire lengths are included.

Wound Rotor Motors 5

Tri-Clad 55 wound rotor motors are described in Bulletin GEA-6713. They are for either crane or general industrial applications and are available from 5 through 150 hp with adjustable varying speed. *General Electric Co.*

Steel Tubing 6

The Babcox & Wilcox Co. has prepared a six page technical data folder that explains how smooth inner diameter welded carbon steel tubing is produced so as to enable the fabricator to cut production time and reduce costs in the manufacture of hydraulic cylinders.

Small Motors 7

Catalog U-1 is an informative catalog covering a line of undirectional nongeared motors featuring high starting torque and low inertia rotors to provide quick and positive starting under adverse conditions. *Barber-Colman Co.*

Industrial Television 8

Bulletin 2239 features 12 pages describing a line of major types of industrial television equipment and gives basic suggestions for equipment selection, and illustrates each with case histories. *Diamond Power Specialty Corp.*

Induction Heating 9

Bulletin HF-58-6 offers 12 pages of information on high frequency induction heating equipment and includes data on heat stations and generator control units, application photos and data on heat treating, annealing, brazing, forging and shrink fitting. *Magnethermic Corp.*

(Please turn page)

9/1/58

VOID after Nov. 1

Circle numbers for Free Literature, or New Equipment Information

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46
47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92
93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115
116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138
139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161
162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184
185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207
208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253
254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276
277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299
300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322
323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345
346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368
369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391

YOUR NAME..... TITLE.....

COMPANY.....

PLANT ADDRESS.....

CITY..... ZONE..... STATE.....

FIRST CLASS
Permit No. 36
New York, N. Y.

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

POSTAGE WILL BE PAID BY

AUTOMOTIVE INDUSTRIES
P. O. Box 66,
Village Station,
New York 14, N. Y.

Readers Service Dept.

Drives 10

Reliance V*S Drives are thoroughly described in a 16 page booklet. V*S drives control, change, and regulate drive motor speed, hp and torque. *Reliance Electric and Engineering Co.*

Wet Blast Applications 11

Precision finishing by wet blasting methods is the topic of Bulletin 100 issued by the *Wheelabrator Corp.*

Resistance Welding 12

Volume 5, No. 3, entitled "Resistance Welding At Work," covers resistance welding case histories in both commercial and military fields, including aviation—12 pages. *Sciaky Bros., Inc.*

Non-Fluid Oil 13

Bulletin 559, four pages, covers the use of non-fluid oil for shake-outs and vibrating screens. The use of non-fluid oil for the lubrication of pneumatic tools and equipment is also discussed. *New York & New Jersey Lubricant Co.*

Cold Finished Bars 14

Bulletin 12-5 serves as a simplified guide to the selection and specification of cold finished carbon steel bars. Mechanical properties, formability, weldability, heat treatment response and machinability for 23 different types are discussed. *Joseph T. Ryerson & Son, Inc.*

USE THIS POSTCARD

Thermostats 15

Bulletin 5000 covers the operating principle of both the hermatically sealed and semi-enclosed Stemco Type C thermostats which are built to open or close a low-wattage electrical circuit upon a predetermined temperature increase referenced to the bimetal. Operating temperature is—10 to 300 F. *Stevens Mfg. Co., Inc.*

Switch Catalog 16

Catalog 62c, 32 pages, is an enlarged edition of a basic switch catalog. Significant developments in basic switches for industrial and commercial applications are featured. *Micro Switch Div. of Minneapolis-Honeywell Regulator Co.*

Plastic Tooling 17

Plastic tooling and its advantages and applications are outlined in an eight page booklet prepared by *Arvin Industries, Inc.*

Fork Lift Trucks 18

Fork lift trucks in the 3000 to 10,000 lb capacity ranges are described in four page Bulletin Bu-481. *Allis-Chalmers Mfg. Co.*

Coil Springs 19

A 48 page handbook is available from the Crucible Steel Co. of America including mathematical data and charts to aid users of coil springs in industry to develop springs to meet their exact specifications.

Plastic Parts 20

A wide variety of zinc alloy die cast and molded thermoplastic products is featured in a recent edition of a bulletin entitled "Small Parts For Industry." *Gries Reproducer Corp.*

Protective Device 21

Bulletin 2002 describes the Alnor Pyrotac, which is an excess temperature protective device to sound an alarm and/or shut down upon reaching the safe maximum temperature. Eight pages. *Illinois Testing Laboratories, Inc.*

Chemical Milling 22

Chemical milling of cast parts is explained in detail in Design Bulletin 7. Tolerances obtainable, suitability, overall and controlled area reduction, and surface finishes that can be expected when casting such metals as aluminum, magnesium, magthorium, steel, and other cast alloys are discussed. *United States Chemical Milling Corp.*

BUSINESS REPLY CARD
No Postage Stamp Necessary If Mailed in the United States

FIRST CLASS
Permit No. 36
New York, N. Y.

POSTAGE WILL BE PAID BY

AUTOMOTIVE INDUSTRIES
P. O. Box 66,
Village Station,
New York 14, N. Y.

Readers Service Dept.

VOID after Nov. 1 — Circle numbers for Free Literature, or New Equipment Information — 9/1/58

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46
47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92
93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115
116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138
139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161
162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184
185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207
208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253
254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276
277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299
300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322
323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345
346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368
369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391

YOUR NAME.....TITLE.....

COMPANY.....

PLANT ADDRESS.....

CITY.....ZONE.....STATE.....

MODERNIZATION of Production Equipment A MUST

(*Continued from page 78*)

were replaced by more modern equipment; and what equipment requires the most immediate consideration because of tangible savings. Incidentally, this evaluation also equates the desirability of using the machine for *one more* year as against the economy of the first year's service of the proposed new machine.

EATON MFG. CO. — Equipment replacement is based upon productive capacity, maintenance costs, and changes in products which may necessitate purchase of new equipment to produce parts of acceptable quality and the lowest cost.

5—How Is Replacement Paid For?

Formal accounting practice indicates that replacement of capital equipment is to be paid for out of a depreciation reserve fund. At least that has been the stated policy for many years. By contrast, the respondents in this survey all agree that replacement is handled on an "if and when" basis and is paid for out of a new appropriation each year. This is evidenced by the several replies noted here.

CATERPILLAR TRACTOR—When a decision is made to buy new equipment it is paid out of a new appropriation budgeted each year, rather than from a reserve fund.

CLARK EQUIPMENT — Replacement of capital equipment is handled through a special capital equipment budget set up for each year.

ALLIS-CHALMERS — Here they employ an obsolescence factor which is included in the year's cost for the proposed equipment since it contributes to the cost of operation of the machine for that year. The obsolescence factor for a proposed machine is included on a chart used in determining the first year's cost and is reflected in similar fashion in evaluating the usefulness of the existing machine.

EATON MFG. CO.—Corporate policy for capital expenditures requires, in all cases, a complete incremental profit statement compiled by the accounting and industrial engineering departments. This includes an estimate of percentage return on the investment which is considered before the purchase of new equipment can be authorized. It is of interest that Eaton does have a practice of setting up normal depreciation reserves. The factor of obsolescence, therefore, is given due consideration in establishing depreciation rates.

It is obvious from the foregoing that the individual manufacturers do keep track of existing capital equipment and demand that replacement be justified on the basis of engineering economy. In a field where general purpose machines are largely used, where production rates are comparatively low as compared with the numbers in vehicle production, the age of the machine is given very little weight except as a signal for studying the justification for retaining the old machine.

Nevertheless, no manufacturer engaged in a highly competitive field can afford to ignore the impact of new methods, new tooling that requires higher speeds and feeds, greater rigidity, and increased motive power. Moreover, all of the older equipment must be judged critically from the standpoint of its ability to maintain higher levels of quality, better surface finish where indicated, and still higher productivity.

The conclusion is that parts makers, tractor and truck builders, and others in the automotive industries must be everlastingly alert to the new developments stemming from the inventive efforts of the machine tool builders. The fact is that quite often even a machine that is only one or two years old

PHILLIPS OR SLOTTED
TAPPING SCREWS
BY Southern

in STEEL, ALUMINUM, OR STAINLESS
FLAT, ROUND, OVAL, PAN, TRUSS, HEX
Types: A, B, C & F

Southern makes the tapping screws you need for faster, more profitable production... Rigid quality-controlled manufacturing methods in our own plant, employing only U.S.A. workers and materials, means that you can safely place full confidence in Southern as your one source for fasteners.

Over one billion Southern screws in stock. Four Southern warehouses mean service with a capital S!

Wire or phone your requirements, or write Southern Screw Co., P. O. Box 1360, Statesville, N.C.

A. B. C & F TAPPING SCREWS
DOWEL SCREWS • MACHINE SCREWS & NUTS • CARRIAGE BOLTS • STOVE BOLTS • WOOD SCREWS • SPEAKER SCREWS
HANGER BOLTS • WOOD KNOB SCREWS • DRIVE SCREWS

WAREHOUSES: NEW YORK, CHICAGO, DALLAS, LOS ANGELES

Southern SCREW COMPANY
STATESVILLE • NORTH CAROLINA

Why MICROHONING AT EVINRUDE trims costs . . . booms productivity . . . eliminates operations . . . improves quality

Evinrude Motors, Division of Outboard Marine Corporation, has replaced with Microhoning their former method of processing conn bores. Here's why:

MICROHONING INCREASES PRODUCTIVE CAPACITY 23 TIMES

Before Microhoning equipment was installed, Evinrude used diamond boring on wristpin and crankpin bores. Now! A per-man productivity comparison of the two processes shows: diamond boring, 300 rods in 40 hours; *Microhoning, 7,000 rods in 40 hours.*

Shown to the left is one of two lines of Microhoners. Each machine has: Microdial automatic stone-feed and stone-wear compensation; automatic stone-wear indicator; and Microsize Gage Ring automatic sizing control.

REDUCES OPERATIONS

Greatest cost-cutting contribution made by Microhoning is *elimination of three former operations:*

1. Re-milling locating faces of wristpin bores.
2. Straightening of rods after boring.
3. Milling oil hole grooves in wristpin bores.

ELIMINATES BRONZE INSERTS

The functional surface characteristics of Microhoned rod bores preclude the need for bronze bushings or shoes. Based on current production schedules, *the cost of millions of bronze inserts will be saved this year.*

ASSURES FEWER REJECTS

From a Microhoning run of 62,000, receiving 100% inspection on an air gage, only 200 rods required reprocessing. *This is a rejection rate of only 3/10 of 1%.*

IMPROVES PRODUCT QUALITY

Microhoning is a low-velocity abrading process that leaves bore surfaces free of torn, smeared or burned metal. Benefit: *Rods that have precise, longer wearing bores.*

To learn more of why Microhoning provides efficient stock removal, closer tolerances and functional surfaces, write to:

MICROMATIC HONE CORP.
8100 SCHOOLCRAFT AVENUE · DETROIT 38, MICHIGAN

may be rendered completely obsolescent by new developments. This is just as true as is the statement that age is no criterion of the useful life of a machine tool.

As a matter of fact, we have seen evidence in recent years of expensive special-purpose equipment which has justified its installation in a mass production plant despite the fact that it is run only a few hours a day, because of exceptionally high productivity.

BOOKS . . .

MANUFACTURING METHODS AND PROCESSES, *by Arthur C. Ansley, published by Chilton Co., 56th & Chestnut Sts., Phila., Pa. Price, $12.50.* This book is designed to give the executive, the purchasing agent, or the design engineer a broad, general background on the latest developments in manufacturing methods and processes, as well as serve as a textbook in technical schools and colleges. Describing briefly the methods and equipment used in each of the processes, the book stresses the type of parts made by each process, chief applications, and cost. Special attention is given to new developments such as powder metallurgy, investment casting, plastics, ultrasonic machining, dielectric heating, electronic printed circuits, and automation. The book is profusely illustrated.

MOTOR TRANSPORTATION, *by William J. Hudson and James A. Constantin, published by Ronald Press Co., 15 East 26 St., New York 10, N. Y. Price, $7.50.* This book is designed for motor carrier personnel and industrial traffic managers—as well as college students—who want a clear understanding of policies involved in motor carrier operations. The book is organized into three distinct but interdependent parts. The first section deals with the foundations of motor transportation; the second with operating procedures; and the last with the field of interstate regulation. The authors have attempted a broad approach to the subject, with emphasis placed on principles and critical analyses, rather than on an extended discussion of technical details.

CONCISE GUIDE TO PLASTICS, *by Herbert R. Simonds, published by Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y. Price $6.95.* Every practical question about the uses, properties, cost, or sources of all plastics is specifically answered in this book. It describes all known American commercial plastics, including those still in the laboratory stage. It explains the selection, use and forms of plastics, and contains discussions of which ones best suit particular products. Future trends and probabilities in plastics are also discussed, along with a rundown of the newest materials and production methods. A useful feature of the book is a list of the 43 most important plastics producers with their addresses, the names of chief officers, company organization and background, products, trade names, descriptions of operations.

Higher taxes next year are a real possibility. One member of the U. S. Senate who is speaking freely on this subject is Prescott Bush, Connecticut Republican. Mr. Bush says bluntly that Washington faces cumulative deficits for 1958, 1959, and 1960 of more than $20 billion unless the Congress and the Administration have the courage to sharply increase taxes.

National defense now costs about $40 billion a year, and the Pentagon says this figure is necessarily going to have to climb to about $70 billion a year "within a relatively short time." Since Congress lacks the courage to cut the budget by that amount, the only alternative is to increase taxes by that amount, Bush observes.

Democrats in Congress are giving notice that military research management will be a primary campaign issue during the fall months. The line to be followed is shown clearly in a new report by a House Government Operations group with a majority of Democrats.

In the report, the lawmakers blame the Administration for permitting requests for research money to fall in recent years. Funds obtained from Congress have gone unspent, even though costs are rising and weapons are more complex, the report charges.

Old proposals to "reform" the patent system to provide some form of compulsory licensing are being revived in Congress. Support thus far is small but growing. Theory is present exclusive patents aid monopoly power of some large holders. Plans range from all-out compulsory licensing after a short period of exclusive use to forced cross-licensing when needed to aid another invention.

How MICROHONING AT EVINRUDE trims costs . . . booms productivity . . . eliminates operations...improves quality

By installing Microhoning equipment to process wristpin and crankpin bores in conn rods, Evinrude Motors, Division of Outboard Marine Corporation, realized considerable savings. The following comparison with previously used diamond boring shows how Microhoning cut time, materials and costs:

MICROHONING BOOSTS PRODUCTIVE CAPACITY 23 TIMES

Diamond Boring Production Per Man: 300 rods in 40 hours.

Microhoning Production Per Man: 7,000 rods in 40 hours.

Several rod sizes are Microhoned on the same equipment — bore diameters range from .874" to 1.500", bore lengths from .815" to 1.011". Microhoning removes .005" stock from wristpin bores in about 24 seconds (floor-to-floor) and generates a controlled finish of 25 to 30 microinches as specified. On crankpin bores, Microhoning removes .0005" stock to generate specified finish of 3-5 microinches in 17 seconds (F-T-F). Tolerances on both bores are held to .0001" for roundness and straightness, and .0004" on diameter.

Close-up of double unit Microhoner shows operator checking a wristpin bore on air gage. Microdial, which automatically compensates for abrasive wear, is shown in center of photo.

ELIMINATES THREE OPERATIONS

1. Former re-milling of locating face on wristpin bore is eliminated — *Microhoning's float principle maintains original bore location.*

2. Straightening after rough boring is no longer required — *Microhoning tool follows neutral axis of bore.*

3. Milling oil hole grooves in wristpin bores is eliminated — *Microhoning generates a cross-hatch pattern that provides built-in oil reservoirs.*

SAVES COST OF MILLIONS OF BRONZE INSERTS PER YEAR

Microhoning's low-velocity abrading, with efficient cutting over a wide area, produces surfaces free of torn, smeared or burned metal.

Result: Precise bores having surfaces that resist galling and flaking.

Benefit: User obtains longer wearing rod bores and a functional supplanting of bronze inserts.

For further information on Microhoning process or to receive movie "Progress in Precision", write to:

MICROMATIC HONE CORP.
8100 SCHOOLCRAFT AVENUE · DETROIT 38, MICHIGAN

SPECIALIZED EQUIPMENT

(*Continued from page* 128)

GEO. T. SCHMIDT, INC.

NAME PLATE MARKER—The basic unit of a new automatic name plate marker is the Pneumark 10T impact bench press. The stacker feed has adjustable features to accommodate rectangular plates 1 to 2 in. wide and 2 to 4 in. long by 0.014 to 0.024 in. thick.

This feed can be used with a serial numbering head for consecutive numbering. The plates are automatically stacked in numerical sequence after marking. Production rate is 3000 to 3600 per hour.

Circle 216 on postcard for more data

GARDNER-DENVER CO.

CLOSE-QUARTER DRILL—Designed for drilling in close quarters, the Keller Tool 11G-2 series angle air drill has a body diameter of only 1½ in. Capacity is up to 5/16 in., and speed range from 500 to 17,000 rpm.

Gardner-Denver angle air drill is designed for close-quarter drilling

Gears and drive spindle are ball-bearing mounted. The unit offers interchangeable gears, spindles and chucks, and one-shot lubrication with flush type fitting.

Circle 217 on postcard for more data

SANBORN CO.

DIRECT WRITING SYSTEM—A space-saving packaging method is used for 6-channel Sanborn 150 series direct-writing oscillographic recording systems. A single vertical, mobile cabinet contains the Model 156-5466 basic assembly, comprised of six driver amplifier-power supply units and 6-channel recorder assembly. To complete the system, the user adds any of 12 interchangeable plug-in 150 preamplifiers.

The six power supply units occupy 42 in. of panel space above the recorder assembly. Overall dimensions of the cabinet are 78 in. high by 22 in. wide by 25 in. deep. Recorder location places the chart at a convenient height for viewing and making notations.

Circle 218 on postcard for more data

WESSON CO.

MICRO-ADAPTERS—A line of precision Rigidcut milling cutter micro-adapters eliminates the need for adjustable milling machine spindles when the adapters are specified as original machine tooling. With normal face-milling cutter wear up to 0.920 in., the adjustable adapters permit four regrinds before blades must be reset. Adapter adjustments are made in the toolroom at the time of grinding so that machine down time is minimized. Adapter-cutter blade concentricity is held to a total indicated runout of 0.0005 in. Standard adapters are available in five sizes for use with milling cutters ranging from 4½ to 12 in. OD.

Circle 219 on postcard for more data

(*Turn to page* 146, *please*)

lower initial cost
lower service cost

Compare and you will see the ROOSA MASTER fuel injection pump costs less. Use it and you will see that your service costs less. There are fewer parts to service and repair because of the unique design of ROOSA MASTER. It takes less space on your engine, and weighs less than 10 pounds. Even though small in size and light in weight one size serves either a 2, 3, 4, 6 or 8 cylinder engine.

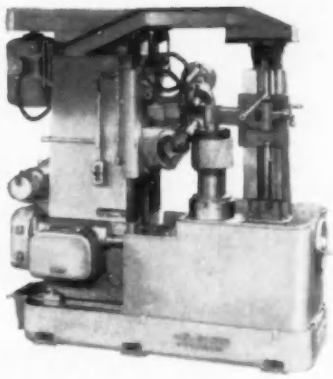
HMS ROOSA MASTER makes good diesels better

HARTFORD MACHINE SCREW CO., HARTFORD 2, CONN.
DIVISION OF STANDARD SCREW COMPANY

The result of 37 years of engineering development is proven in hours and miles of outstanding performance.

Member

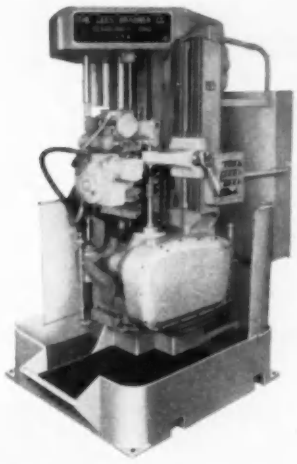
YOU CAN DEPEND ON THE DIESEL THAT DEPENDS ON ROOSA MASTER



MODEL R 16″x18″

Here's a machine designed to handle the really big, tough hobbing jobs. Maximum outside diameter 16″ (18″ with offset tailstock); travel 18″; maximum helix — RH 45° and LH 60°.

Like all Lees-Bradner hobbers, the model R has future capacity built into it.



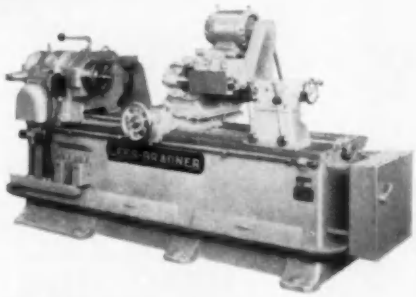
MODEL 7HD 8″x 20″
Single-spindle Hobber

A heavier, faster machine, the single-spindle 7HD hobber combines ruggedness with simplicity. Production is materially increased by the ease with which hobs can be changed and diameters controlled.

If you thread or hob get a better job!

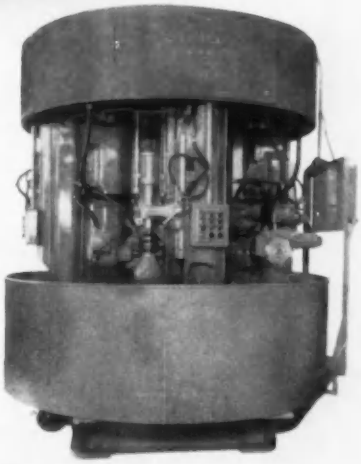
the LEES-BRADNER® Company

CLEVELAND 11, OHIO • U.S.A.



MODEL HT 12″x 54″

A heavy-duty semi-automatic threading machine that has a wide range of leads (1/32″ x 60″) and hence the capacity to handle a wide variety of precision threading jobs. It may be adapted to many attachments for special requirements.



MODEL 7HD 8″x 20″
6-Spindle Hobber

The machine is brought up to the operator via the rotary hobbing process for loading and unloading — greatly easing and enormously augmenting output. This model is equipped with Lees-Bradner in-out mechanism and electric hob shifter.

4-spindle model available, as well as the 8-spindle 7-A Rotary Hobber.

SPECIALIZED EQUIPMENT

(*Continued from page* 144)

SINCLAIR-COLLINS VALVE CO.

CONTROL VALVE — Announcement has been made of a complete line of 6000 lb, 2 and 3-way control valves for use on plastic molding, ceramic forming and similar equipment requiring high operating pressures. These valves feature bodies machined from solid aluminum bronze bar stock. The sleeve type construction with a replaceable hardened stainless steel seat sleeve insert in the valve body is said to assure alignment of the valve stem and seats at all times. Stem seats are Stellite faced.

Available in ½ through 2 in. NPT sizes and suitable for control of high pressure fluids, these 6000 lb 2 and 3-way valves are designed for use with Sinclair-Collins cycle controllers, with any applicable pneumatic or electro-pneumatic cycle control device, or for manual operation. The valve diaphragm is actuated by 35 to 40 psi air. All valves are offered either normally open or normally closed, with balanced stems.

Sinclair-Collins control valve

Circle 220 on postcard for more data

FENWAY MACHINE CO.

PORTABLE NIBBLERS—Five portable electric and pneumatic nibblers, capable of cutting up to 10 gage stainless steel or 8 gage mild without distortion operate on a unique punch and die principle.

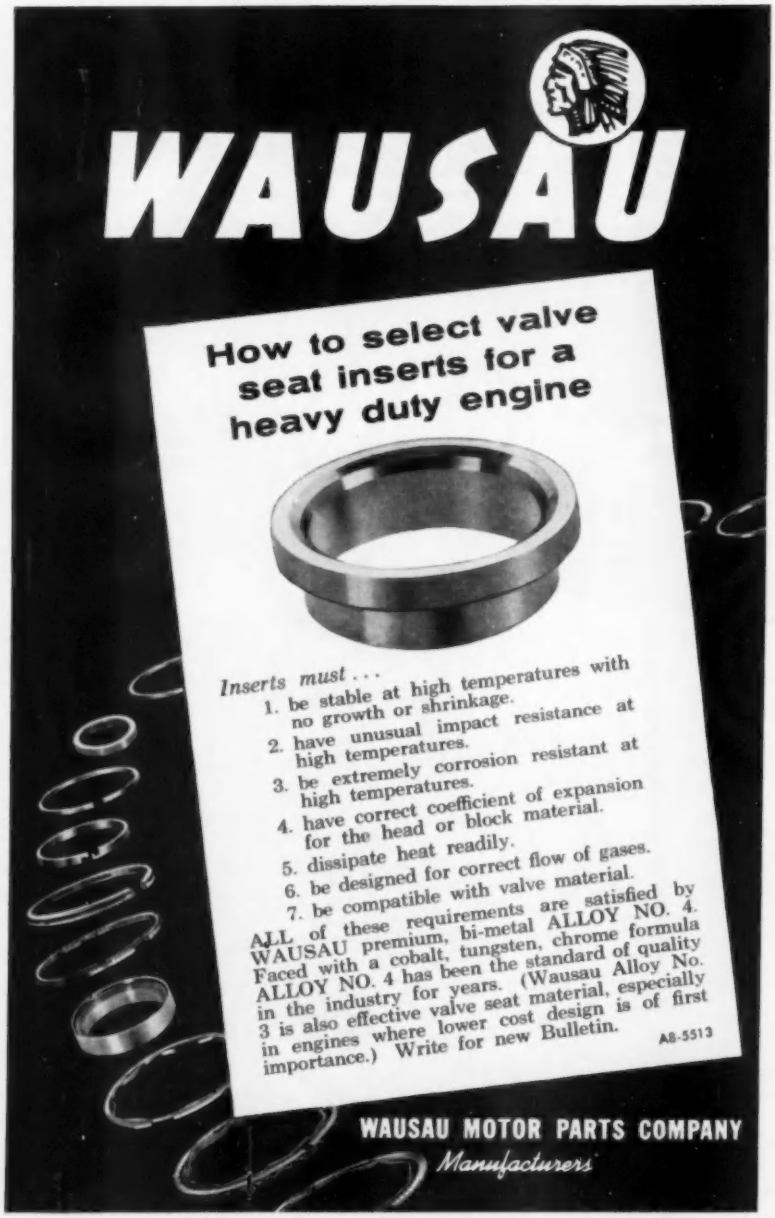
Model AN is an air powered tool weighing 12 lb. It can cut up to 3/16 in. of copper, brass or aluminum, as well as 10 gage stainless steel and 8 gage mild. Both the AN and HN models can cut inside circles, squares and odd shapes in a minimum radius of six in., with a 2¼ in. starting hole on 10 gage stainless or eight gage mild.

Fenway portable nibbler Model AN

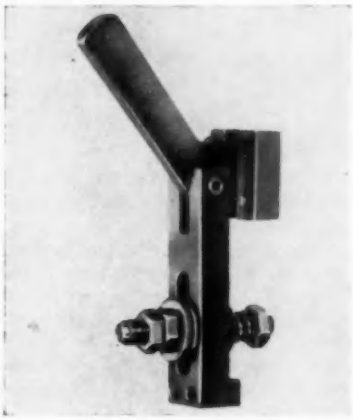
Circle 221 on postcard for more data

JERGENS TOOL SPECIALTY CO.

CAM CLAMP—Offering fast action for light duty clamping where you must move quickly in restricted


WAUSAU
How to select valve seat inserts for a heavy duty engine
Inserts must . . .
1. be stable at high temperatures with no growth or shrinkage.
2. have unusual impact resistance at high temperatures.
3. be extremely corrosion resistant at high temperatures.
4. have correct coefficient of expansion for the head or block material.
5. dissipate heat readily.
6. be designed for correct flow of gases.
7. be compatible with valve material.
ALL of these requirements are satisfied by WAUSAU premium, bi-metal ALLOY NO. 4. Faced with a cobalt, tungsten, chrome formula ALLOY NO. 4 has been the standard of quality in the industry for years. (Wausau Alloy No. 3 is also effective valve seat material, especially in engines where lower cost design is of first importance.) Write for new Bulletin.
A8-5513
WAUSAU MOTOR PARTS COMPANY
Manufacturers
2300 Eau Claire St., Schofield, Wis. • Detroit Office: 1302 Cadillac Tower, Detroit, Mich.

space, a cam type clamp with interchangeable soft metal pads is available in sizes from ¼ to ⅝ in. The pads are attached to the strap with two screws enabling quick changes.



Jergens fast acting cam clamp

Heat treating can be applied for durability on long work-runs and brass or bronze pads can be used for extra soft work. An end slot for lateral adjustment is included.

Circle 222 on postcard for more data

ZAGAR, INC.

DRILL HEAD—Zagar adjustable multi-spindle drill heads are built to accommodate from 2 to 10 spindles in sizes of 7, 10½, 12½ and 15½ in. Bolt circles up to 23 in. in diameter allow most any hole pattern to be drilled or tapped within a given circle.

Spindle arms can be removed and replaced quickly, using two locking set screws. The head, which can be

Zagar adjustable multi-spindle drill head

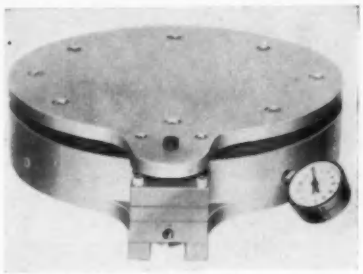
used on any standard drill press, is made as a complete unit, with no auxiliary equipment needed.

Circle 223 on postcard for more data

WEBER INSTRUMENT CO.

MACHINE MOUNTING SYSTEM—Pneumatic machine-supports consisting of a simple air container of nylon-reinforced neoprene and cast aluminum, fitted with a pressure-indicating gage indicate load, maintain level and isolate vibration. In use, a unit is placed under each support point of a machine and connected to the factory air supply (100 psi).

The machine is actually supported on columns of air with no rigid connection between it and the floor. Pressure gage readings indicate machine weight supported by each unit. The new Air-Mounts are designed to support and indicate loads from 500



Weber pneumatic machine-support

(*Turn to page* 148, *please*)

WAUSAU
How to select a set of piston rings for a compressor
TOP RING: Should be specially designed for quick seating, minimum drag, and maximum sealing particularly on the intake stroke.
EXAMPLE: "WAUSAU" Taper Face Compression
SECOND RING: Should be specially designed for quick seating with minimum drag and proper balance between leakage and oil control functions.
EXAMPLE: "WAUSAU" Scraper
OIL RING: Should be specially designed for quick seating, correct unit pressure for maximum oil control with minimum drag, and properly ported for adequate drainage.
EXAMPLE: "WAUSAU" Super Portoil
Quick, effective sealing to prevent efficiency loss, in combination with the barest minimum of frictional drag is the basic requirement for a successfully functioning set of compressor rings. The set should also control oil unfailingly, especially under high vacuum conditions or when running with unloader valve open. WAUSAU COMPRESSOR RING SETS are noted for such performance. Write for specific recommendations.
WAUSAU MOTOR PARTS COMPANY
Manufacturers

2300 Eau Claire St., Schofield, Wis. • Detroit Office: 1302 Cadillac Tower, Detroit, Mich.

V-RINGS

PISTON RINGS

U-RINGS

FLANGES

CUPS

Chemiseal® hydraulic seals . . .

MADE OF
du Pont
TEFLON
T.F.E. fluorocarbon plastic

Chemiseal hydraulic packings are made for every type of static and dynamic seal. They are available in pure TEFLON or in Filled TEFLON (glass, graphite, etc.) depending upon the application and service requirement.

Preferred by Leading Engineers

Because Chemiseal hydraulic seals provide the reliability of chemically impervious TEFLON, they are preferred by leading engineers for maximum security at vital points in aircraft and missile, automotive, marine, ordinance and industrial hydraulic systems.

Outstanding Advantages

Chemiseal hydraulic packings require no chemical inspection, have zero swelling in all hydrocarbons, new synthetic hydraulic fluids and solvents.

They offer unsurpassed antifriction properties, are tough, resilient, non-flammable, long wearing. They function equally well at any temperature from 100 degrees below zero to 500 degrees above.

Write for further information and samples for test.

United States Gasket Co.
Camden 1, N.J.

United States Gasket *Plastics Division of* GARLOCK

SPECIALIZED EQUIPMENT

(Continued from page 147)

to 12,000 lb each with a 100 psi air supply. They can be moved from one machine to the other.

Circle 224 on postcard for more data

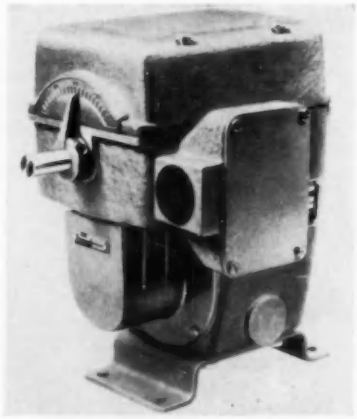
DANLY MACHINE SPECIALTIES, INC.

DIE STOPS—Automatic die stops equipped with brackets that permit mounting on either the top or front of a die are offered in three sizes; 3/16 by 5, ¼ by 6 and ⅜ by 9 in. The stops provide a completely automatic method for stopping stock at the proper index during strip or coil feed stamping operations. The unit may be used with right or left-hand stock feed and is actuated by either a trip spring or bolt-mounted on the punch holder.

Circle 225 on postcard for more data

MINNEAPOLIS-HONEYWELL REGULATOR CO.

VALVE MOTOR—Valves, dampers and other controlled devices can be operated by an electric motor in accordance with signals generated by electric control instruments. Two models, each having two position, floating or

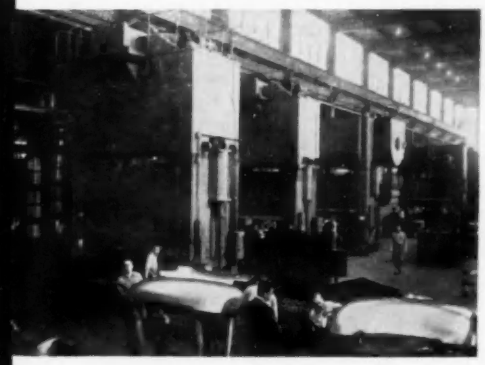

Minneapolis electric valve motor

proportional control forms, are available in various speeds and torques. Series 831E2 has a rated output torque ranging from 1.5 to 31.2 lb ft. Series 831E1 torque rating ranges from 3.1 to 62.5 lb-ft. Stall torques for both series are a minimum of twice the rated torques.

The motor is said to accurately position final control elements over full drive shaft rotation.

Circle 226 on postcard for more data

(Turn to page 152, please)



Morrison Steel Products
draws and stamps countless specialty items from Youngstown Cold-Rolled Sheets in their spacious Buffalo, N. Y. plant.

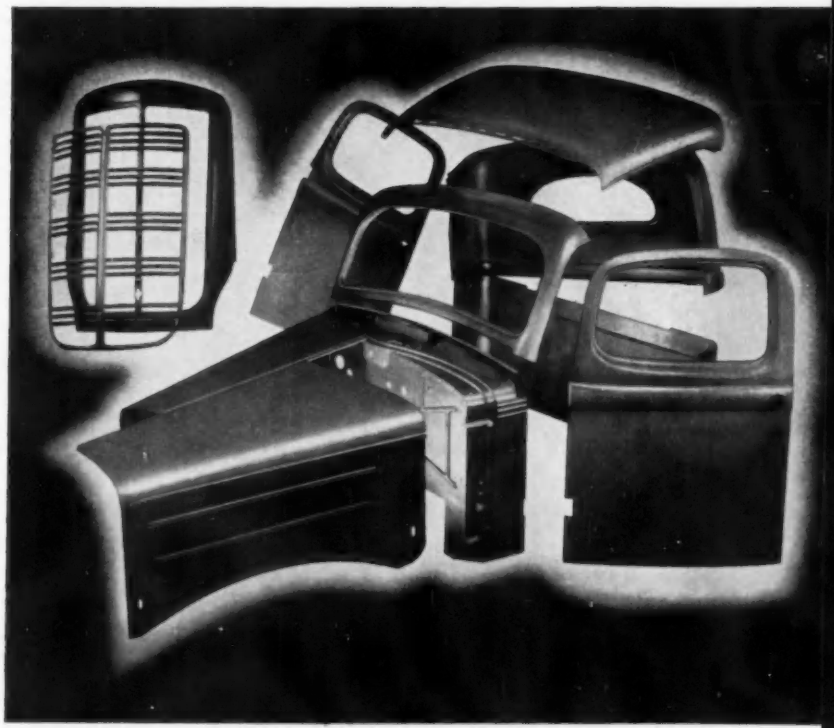
Accent on Excellence

Youngstown cold-rolled sheets

In 1912, Morrison Steel Products, Inc., of Buffalo, were fabricating automobile fenders for custom-built Pierce-Arrow motor cars. Today they have grown into a major contract producer of quality stampings and drawn steel specialties—ranging from overhead garage doors to defense items such as jet engine nose rings.

Perhaps your lawnmower, car door, heating furnace or other products that make life a bit easier, are assembled from Morrison stampings—which begin with the best in basic material, Youngstown Cold-Rolled Sheets.

Wherever steel becomes a part of things *you* make, the high standards of Youngstown *quality*, the personal touch in Youngstown *service* will help you create products with an "accent on excellence".



MORRISON STEEL PRODUCTS, INC.
BUFFALO 7, N. Y.

THE
YOUNGSTOWN
SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel, Youngstown, Ohio

New design in Sigma hand welding torches

Here is a new, lightweight torch—only 16 ounces—for manually welding light-gage steels. Sigma ST-2 welds in all positions with no change in control or current settings. Welds .030- to .100-in. sheet, using low-voltage short-arc technique with .020- and .030-in. hard-drawn wire. For 200 amp continuous service, a-c or d-c.

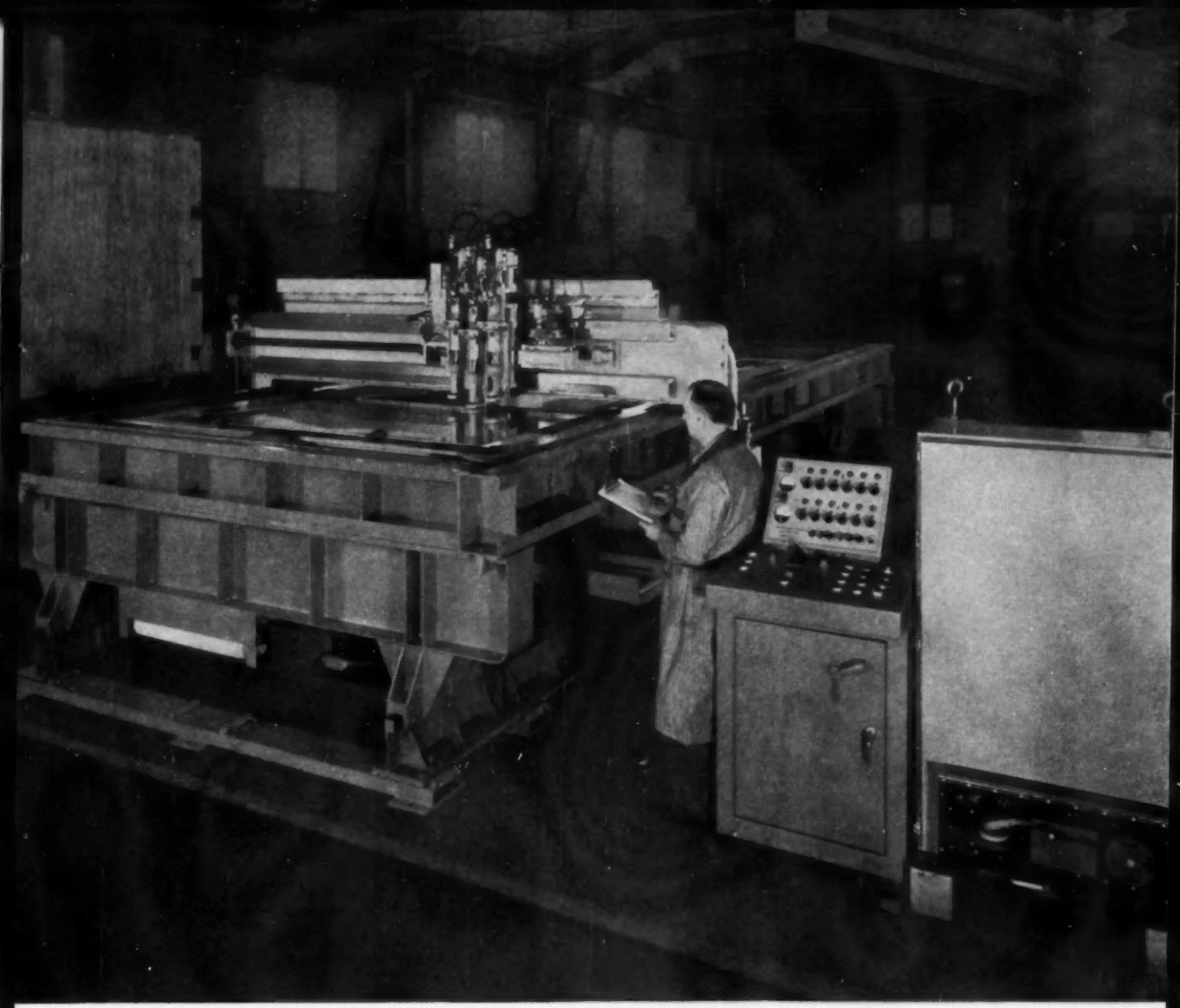
Balanced design makes handling easy. Service lines enter through rear of handle—a convenience in cramped quarters. Start-stop switch on handle, easy to reach. Nozzle has a 60° curve for maximum weld visibility.

Sigma ST-2 makes high-quality welds at high speed. Seams require no cleaning . . . distortion is at a minimum. Inert gas shielding is economical. Low flow rate—only 10 cu. ft. or less per hour—means even more savings.

Call your nearest LINDE office today for a demonstration of this new Sigma ST-2 torch! Or write Dept H91, LINDE COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N.Y. Offices in other principal cities. In Canada: Linde Company, Division of Union Carbide Canada Limited.

Linde TRADE-MARK UNION CARBIDE

"Linde" and "Union Carbide" are registered trade-marks of Union Carbide Corporation.



Largest Automatic Precision Drill Locates, Drills and Counterbores Holes at Record Speeds

TAPE CONTROLLED MACHINE HAS AN ACCURACY OF .005" IN FULL 108" X 200" TRAVEL

Designed for aircraft work, the McKaymatic is a two dimension positioning and drilling machine that mounts three drill units on a gantry type carriage, permitting a selection of hole sizes or counterbores in a fixed work piece 9' x 16'.

Hole locations are programmed by an engineer. This data is converted into a binary code on an 8 channel 1" wide paper tape. A tape reader and decoder relays the command information through a numerical, 2 dimension positioning control to servo drives in each axis. "Farrand Inductosyn Scales" mounted on the machine locate the drills to within .005" in the full 108" (y) and the 200" (x) axis travel.

A "zero" offset unit incorporated in the control system permits fast set-up. Templates are eliminated . . . layout time and human errors are eliminated . . . floor space requirements are kept to an absolute minimum.

Because the machine can work efficiently on short runs, and can be instantly "changed over" to other work, it will cut drilling costs in many metal working applications.

It's problem solving of this type that has made McKay an outstanding name in the aircraft, automotive, fabricating and steel industries. *The McKay Machine Company, Youngstown, Ohio.*

McKAY MCK MACHINE

THE LATEST WORD IN SPRING FASHIONS
SPRINGINEERING
BY AUTOMATIC
"SPRINGINEERING" at AUTOMATIC assures you of springs you can depend upon, quality-controlled to your exacting specifications.
TWISTEEL
TWISTEEL is formed with uniform pitch in widths to 1¼ inches in any desired length. Made from ferrous and non-ferrous materials with varied applications as agitators, baffles, turbulators, and ornamentation.
Consult our engineering staff on your requirements concerning precision mechanical SPRINGS, WIRE SHAPES or TWISTEEL.
for quality springs "Automatically" think of
AUTOMATIC SPRING COILING CO.
4049 West Thorndale Avenue • Chicago 30, Illinois

SPECIALIZED EQUIPMENT

(*Continued from page* 148)

REED ROLLER BIT CO.

PNEUMATIC GRINDER—Latest in a line of pneumatic hand tools are the new 1500 series grinders which were designed for use in a variety of metal grinding, sanding and wire-brushing operations. Magnesium alloy castings are used in this new device and the lever-type thumb-tip

Cleco grinder for metal grinding, sanding, and wire-brush operations

throttle provides control. A special muffler handle reduces noise and serves as an air exhaust. The basic tool is available in a variety of speeds and for several different wheel and guard mountings.

Circle 227 on postcard for more data

FEDERAL PRODUCTS CORP.

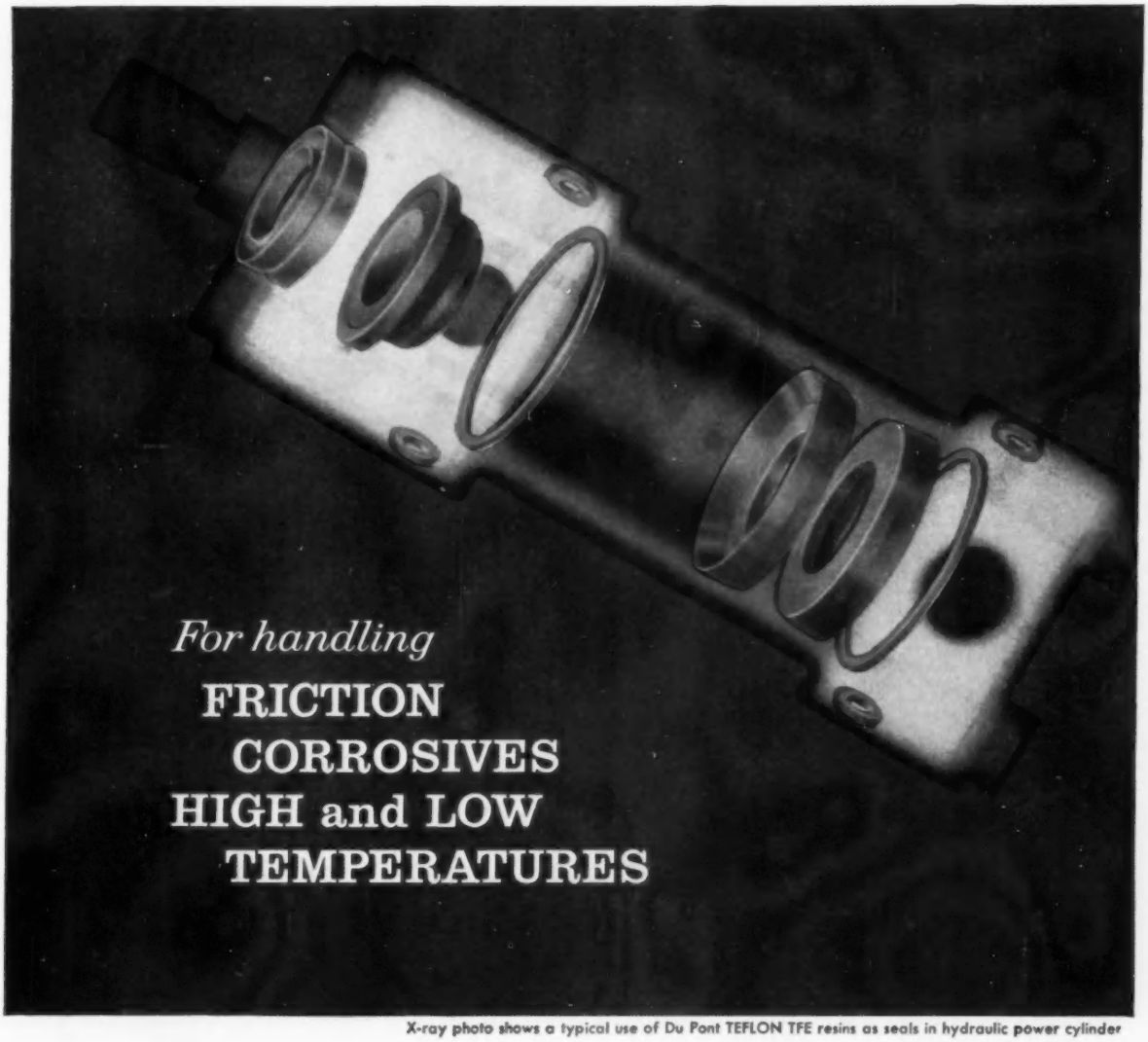
AIR GAGE METER—The Federal Dimensionair air gage meter with remote pressure regulating and filtering consists of two separate units, an air meter in a compact housing and a regulator-filter assembly. Since it incorporates a fixed magnification system, the filtering and regulating elements of the gage are not called upon to perform the added function of setting gage modification. This enables these elements to be separated physically from the metering portion of the gage, with one regulator filter serving up to five meter units. Meter units are connected to the centrally located regulator by a five ft hose rather than by piping.

Circle 228 on postcard for more data

JAS. H. MATTHEWS & CO., INC.

NAMEPLATE MARKER—The No. 222 nameplate marking machine is designed for marking constant and changeable data on preformed nameplates. Pneumatically operated and solenoid controlled, this unit utilizes a roll principle of indenting the marking. As the master chase is moved into the machine head, a micro-switch automatically actuates

(*Turn to page* 154, *please*)



X-ray photo shows a typical use of Du Pont TEFLON TFE resins as seals in hydraulic power cylinder

Here's why seals of TFE-fluorocarbon resins may be your solution

Seals of TFE-fluorocarbon resins give outstanding protection against leakage; they reduce maintenance costs, improve SAFETY and RELIABILITY. The reasons are many—

TFE resins are among the most chemically inert materials known to science. They are rated for continuous use at temperatures from -450°F. to 500°F. and have the lowest coefficient of static friction of any solid substance known.

The low surface friction of seals of TFE resins makes for reduced torque and easy operation. As in the hydraulic cylinder shown above, these seals reduce oil leakage, will not stick or freeze, require no adjustment and are shearproof. Seals of TFE resins are available in all basic designs and configurations.

Discover how you can improve automotive products and production with seals of Du Pont TFE-fluorocarbon resins. For product and design information see your local supplier. Look for him under "Plastics—Du Pont", in the Yellow Pages or write to: **E. I. du Pont de Nemours & Co. (Inc.), Room AI2524, Nemours Building, Wilmington 98, Delaware.**

In Canada: Du Pont Company of Canada (1956) Limited, P.O. Box 660, Montreal, Quebec.

PISTON RINGS of a filled TFE resin in control cylinder help throttle a fiery jet engine. Rings operate without lubrication... handle corrosive hydraulic fluids at 350°F. and 3000 psi for over 300 hours without wear.

DU PONT
REG. U. S. PAT. OFF.

TEFLON®
TFE-FLUOROCARBON RESINS

TEFLON is Du Pont's registered trademark for its fluorocarbon resins, including the TFE (tetrafluoroethylene) resins discussed herein.

BETTER THINGS FOR BETTER LIVING... *THROUGH CHEMISTRY*

SPECIALIZED EQUIPMENT

(*Continued from page* 152)

the pressure roll beneath the chase, impressing the type into all blank panels of the plate in one stroke. Marking capacity is 500 to 700 plates per hour. A large variety of type character sizes is available from 1/32 to ½ in.

Circle 229 on postcard for more data

Matthews automatic nameplate marker

THOR POWER TOOL CO.

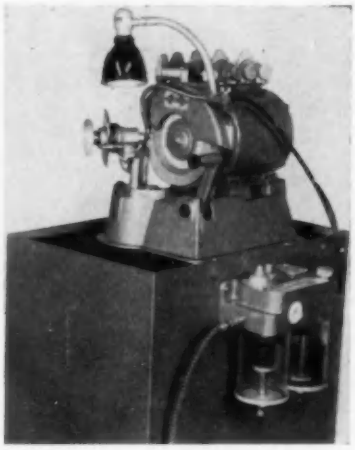
TWO-SPINDLE NUTSETTER—This two-spindle nutsetter unit feeds and runs down wing nuts automatically, using integral air-driven nutsetters with nut-tension control. Parts to be assembled are placed under the unit and this automatically activates the machine by means of air valves. An electrically-driven vibratory unit feeds two wing nuts into position and the machine's two air setters run down the wing nuts. Torque is controlled by a Thor air regulator which prevents overdriving the nuts or breaking the studs.

Circle 230 on postcard for more data

BLACK DIAMOND SAW & MACHINE WORKS

MIST COOLANT SYSTEM — The Spraymist unit is available as a separate package for mounting on all existing grinders, or as an optional extra on new models. The system directs a jet of cool mist at the point grinding contact.

Requiring only a standard connection to shop air supply, the system



Black Diamond mist coolant system

includes the unit, extension tube, jet and dual hose. A single unit can feed other remote jets for use on other grinders or shop equipment nearby.

Circle 231 on postcard for more data

JAS. H. MATTHEWS & CO., INC.

MARKING EQUIPMENT—The No. 248 offset printer is designed for continous, lineal printing on steel, aluminum or plastic pipe, bars, tubing or other like products. Mounted directly over a moving production line, it is capable of printing on an unlimited range of product sizes from ½ in. OD.

Circle 232 on postcard for more data

Thoroughly Proved...

BY YEARS OF HARD EVERYDAY USE IN THOUSANDS OF PLANTS

HANSEN QUICK-CONNECTIVE PUSH-TITE COUPLING

instant automatic flow and shut-off
quick connection and disconnection
leak-proof minimum wear locking device
integral factory assembled tamper-proof socket head

ONE-WAY SHUT-OFF

Locking pins in Hansen Push-Tite Coupling Socket afford large area contact with Plug, thereby preventing wear and subsequent leakage.

The ability of Hansen Push-Tite Couplings to withstand severe service—with practically no maintenance—has been thoroughly proved by years of hard, everyday use in thousands of plants. The "socket head", which contains the locking device, is factory assembled into a rugged integral unit which cannot be readily injured or have component parts lost by casual tampering.

To connect the Coupling, you merely push the Plug into the Socket with one hand. Flow is instantaneous. To disconnect, push back sleeve on Socket—Coupling disconnects. Flow is shut off instantly and automatically.

QUICK-CONNECTIVE FLUID LINE COUPLINGS for

AIR • OIL • GREASE
HYDRAULIC FLUIDS • WATER
VACUUM • STEAM • OXYGEN
ACETYLENE • REFRIGERANTS
GASOLINE • COOLANTS

WRITE FOR THE HANSEN CATALOG

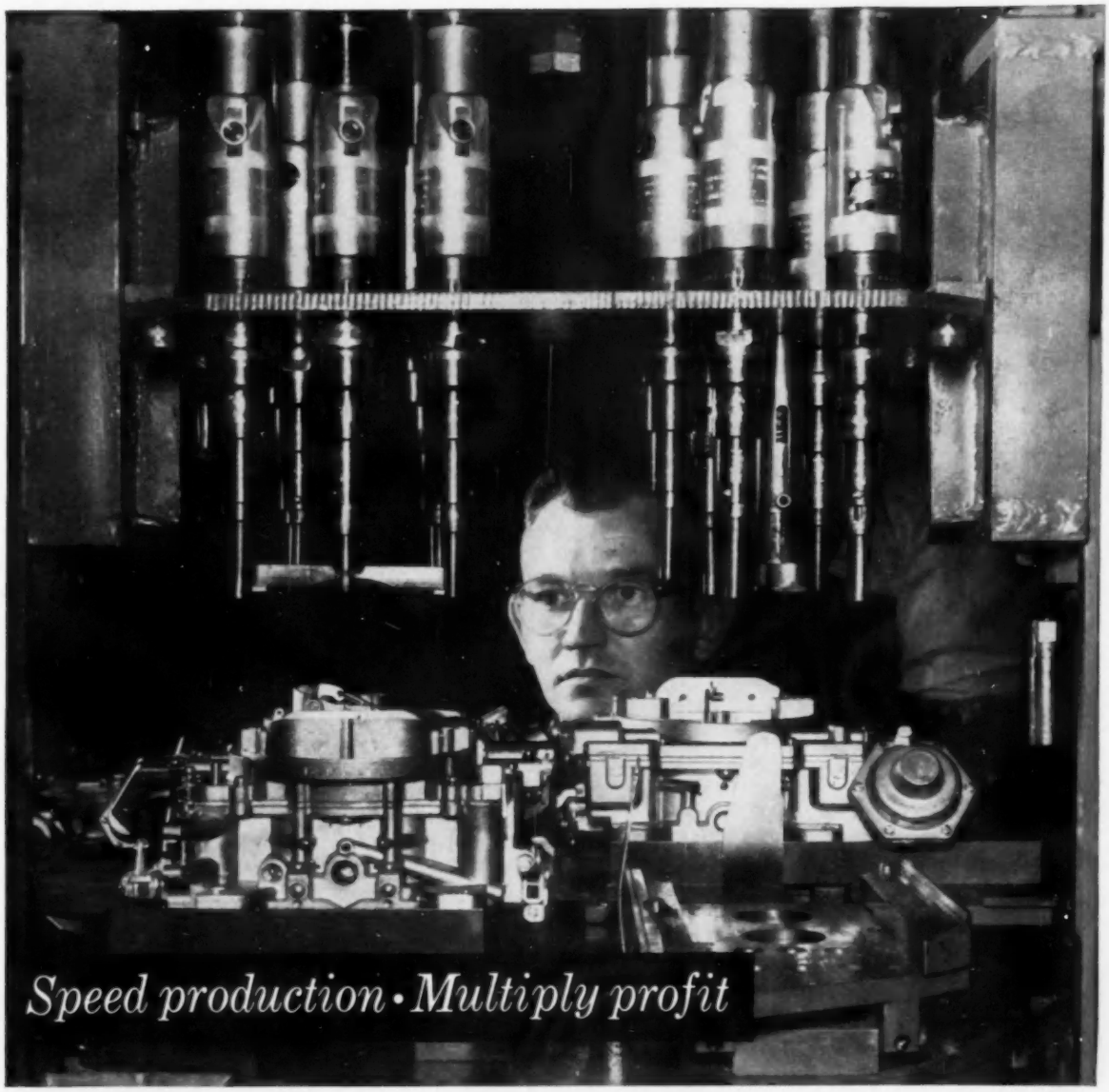
Here's an always ready reference when you want information on couplings in a hurry. Lists complete range of sizes and types of Hansen Quick-Connective Couplings. Write for your copy.

Representatives in Principal Cities

SINCE 1915 · QUICK-CONNECTIVE FLUID LINE COUPLINGS

THE HANSEN MANUFACTURING COMPANY

4031 WEST 150th STREET • CLEVELAND 35, OHIO



Team of ten spindles prepares to drive home equal number of screws in this assembly of carburetors at Carter division of ACF Industries Inc., St. Louis, Mo. All fasteners are secured simultaneously at identical torque. Initial cost of Thor multiples is low—so is cost of maintenance.

THOR MULTIPLE NUT SETTERS AND SCREWDRIVERS

Thor multiples are custom engineered to your order. Any assembly involving 2 to 22 fasteners can be completed faster, more efficiently—with great labor savings. Product or pattern is no problem. Write today for Thor's complete automation manual on multiple fastener settings. Thor Power Tool Company, Aurora, Illinois.

Thor PORTABLE POWER TOOLS

Atlanta • Birmingham
Boston • Buffalo • Chicago
Cincinnati • Cleveland
Denver • Detroit • Houston
Indianapolis • Kansas City, Mo.
Los Angeles • Milwaukee
Newark • Long Island City, N.Y.
Philadelphia • Pittsburgh
Richmond • St. Louis
San Francisco • Seattle
Toronto, Canada
Export Division, New York City

THOR POWER TOOL COMPANY, AURORA, ILLINOIS

Have you compared the cost per foot of the solid stock you may now be using with the per foot cost of tubing? By designing and building with hollow steel tubing to begin with instead of solid stock, designers and engineers have often found that a great deal of money can be saved. This can also mean a tremendous reduction in overall unnecessary weight without sacrificing in the least any needed strength or durability. In fact the opposite is often true. The use of steel tubing can mean reduced cost of material and weight with adequate strength. Standard is anxious to analyze your mechanical requirements and suggest where possible how tubing can help your specifications take shape...at a lower cost.

FREE: A vitally important table comparing the weight savings of hollow tubing versus solid stock to help you reduce steel costs. Write address below.

BULLETIN FREE

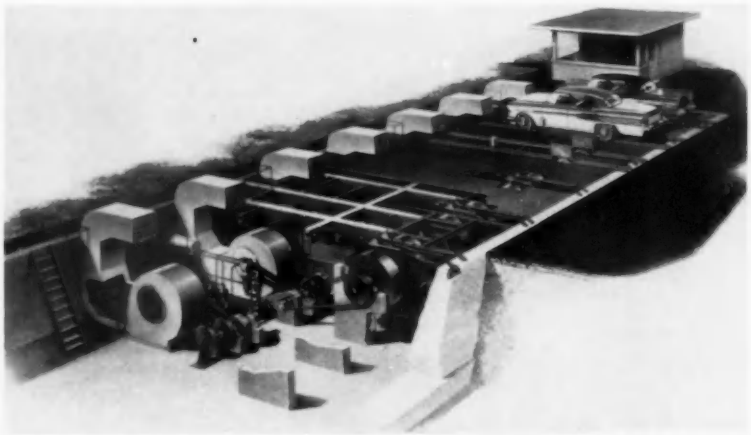
weight savings and physical advantages of tubing for shafting, structural members, and mechanical parts

STANDARD

THE STANDARD TUBE COMPANY and MICHIGAN STEEL TUBE PRODUCTS DIVISION

24400 Plymouth Road • Detroit 39, Michigan

Welded stainless tubing and pipe • Welded carbon steel mechanical • Boiler and Heat Exchanger • Exclusive rigidized patterns • Special Shapes • Steel Tubing —Sizes: ⅛" OD to 6" OD—.028 to .270 wall • Stainless—Sizes: ¾" OD to 4½" OD—.020 to .187 wall



Cutaway drawing shows assembly of Esso Research and Engineering Co.'s new automated treadmill in Linden, N. J.

AUTOMATION NEWS REPORT

(*Continued from page* 134)

The treadmill installation can be set for both open road or city driving, or a combination of both. Hydraulically controlled clamps attached to the car's rear axles hold it fixed on the treadmill.

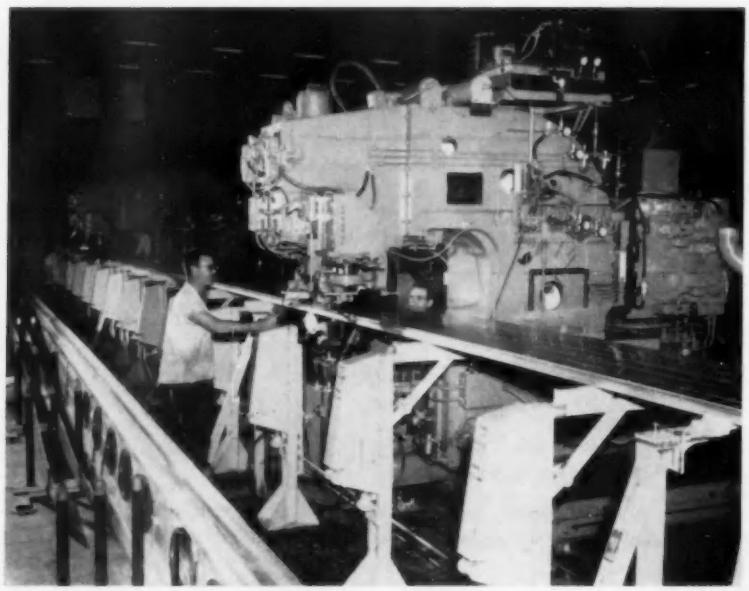
Esso Research engineers report that the new treadmill provides more accurate test information than conventional road runs because different fuels and lubricants can now be compared under exactly the same conditions. This is made possible by the magnetic control tapes which can be used over and over again to reproduce the same engine patterns.

Esso Research said the new installation will probably record more than a million test miles in the next year.

NUMERICALLY CONTROLLED RIVETERS

Four new numerically controlled riveting machines at Boeing Airplane Co.'s Wichita plant

(*Turn to page* 161, *please*)



Riveting machines at Boeing's Wichita plant control by signals on punched tape

COOPERATION . . .
THE STORY BEHIND THE GREENLEE MACHINE

Production difficulties with hydraulic steering gear housings sparked a bold, new idea . . . an automatic transfer machine capable of performing 114 machining operations to close tolerances on rough castings, at the rate of more than 200 pieces per hour. These production problems were:

1. Maintenance and expense.
2. Locating on a rough casting.
3. Marring finished surfaces.
4. High percentage of scrap.

Any new production method must solve these problems and show savings to justify the investment in new machinery.

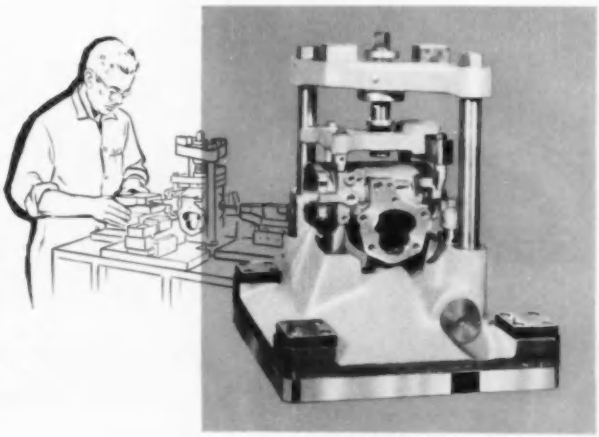
These problems were discussed during a meeting with the customer. Greenlee sales engineers made a careful, complete study of the problems and prepared a machine proposal sketch, a wooden model of the work holding pallet, and a firm price for the recommended equipment.

Meetings were held at Rockford and at the customer's plant where management, production, tooling and inspection people . . . engineers from both companies, who were familiar with the job, participated. In addition, arrangements were made for the customer to visit other plants where Greenlee machines were in operation. These visits enabled them to see operations similar to the ones required on the proposed machine.

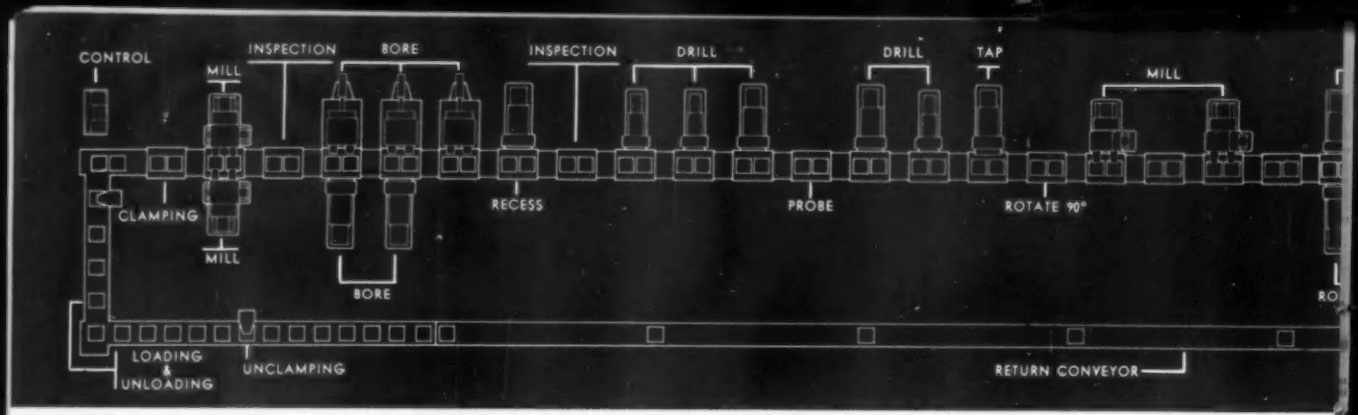
Operations studied included the handling of chips and coolant, foundation design, gauging on the machine, tool grinding, use of pre-set tools and tool control boards, and accuracy of Greenlee machines after years of continuous use. Specific machining operations were also studied on transfer machines similar to the one being planned.

After all of these factors had been carefully analyzed by the customer, the Greenlee proposal was approved.

The machine was designed to handle the rough casting in a work holding fixture or pallet. Once located and clamped in the pallet, the housing is completely machined before being released. All machining operations are performed in proper relation to each other, and any tendency to mar finished surfaces is eliminated.



GREENLEE BROS. & CO. ROCKFORD, ILLINOIS, U.S.A.



A walking-beam type of transfer mechanism was used to carry the pallet from station to station. Thus the clamping pads and locating bushings of the pallet would be kept clean and free from burrs or chips. These critical surfaces are never touched by the transfer bars or anything else except the mating clamp pads and locating pins which enter the bushing at the work station. The castings are machined two at a time until they reach the last machining section where they are finish bored four at a time.

The pallets then enter the return conveyor one at a time where a number of de-burring operations are performed. Finally they transfer through a two stage flushing and blow-off unit where pallets and castings are cleaned before their rapid-return to the head of the machine for automatic unclamping.

The machine itself is of the usual Greenlee Rearrangeable Unit design to facilitate shipping and installation, and to take care of possible future engineering changes and improvements in design of the part.

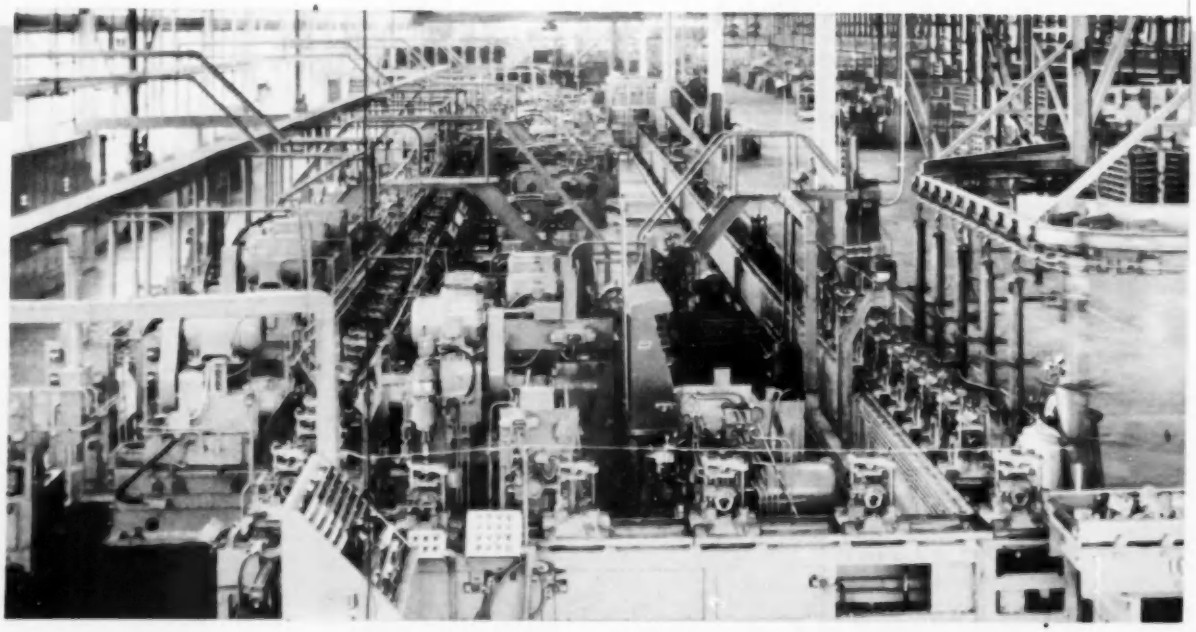
Thus, proper design of the machine and the closely coordinated details of tooling and installation *SOLVED THE FIRST PRODUCTION PROBLEM*. Use of pallets for locating and holding the castings *SOLVED THE LAST THREE PRODUCTION PROBLEMS*.

Throughout the design and building period, details were checked carefully with the customer's tool engineers, production people, inspectors, maintenance and plant engineers. During the final stages of assembly and testing in the Greenlee plant at Rockford, these people were thoroughly schooled in technical details of the machine.

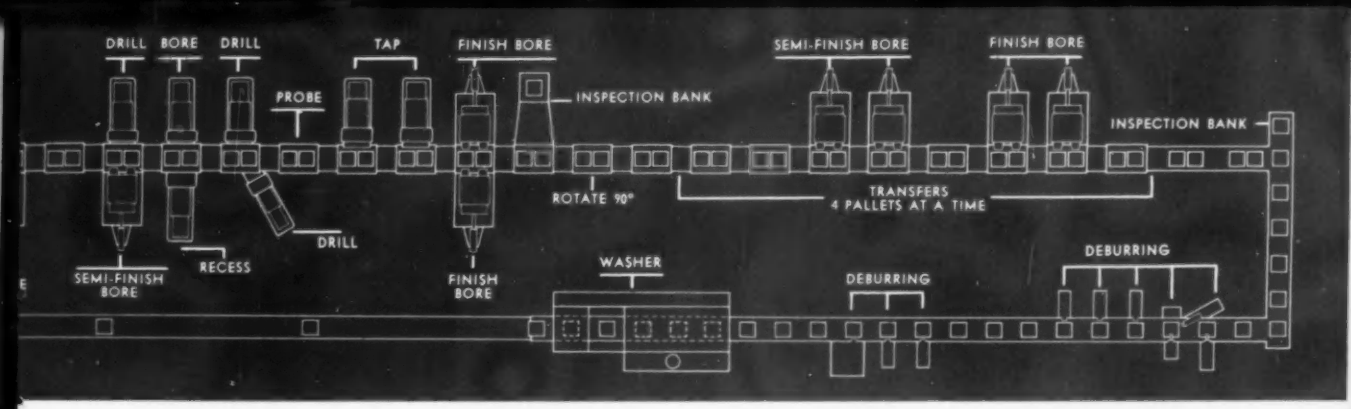
Following successful test runs, the machine was dismantled and shipped. The first of 21 truck loads left the Greenlee plant on a Tuesday morning — the last one Friday. The next Monday evening . . . six days after the first shipment . . . the machine was automatically cycled in the customer's plant and put into production. Cooperation between experienced Greenlee supervisory personnel and customer's men made this record possible.

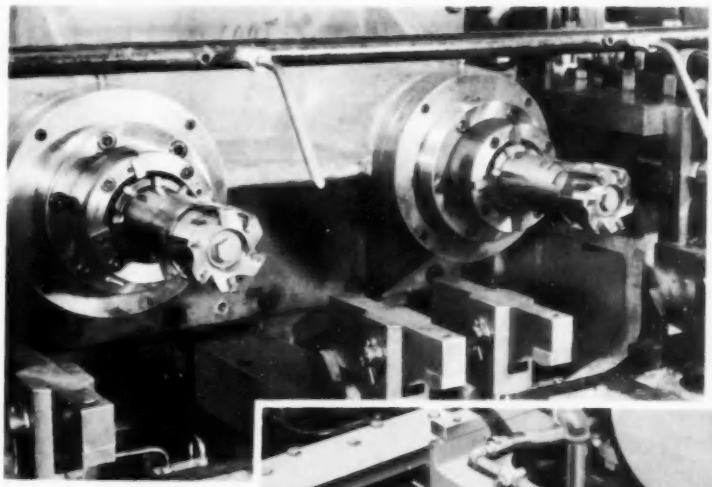
This is the story behind the machine . . . a story that began with a production problem . . . a problem that has been successfully solved by the intelligent cooperation of the men who represent the machine builder and the machine user . . . cooperation that made it possible to produce parts to close tolerances at the required production rate with a minimum of maintenance and expense.

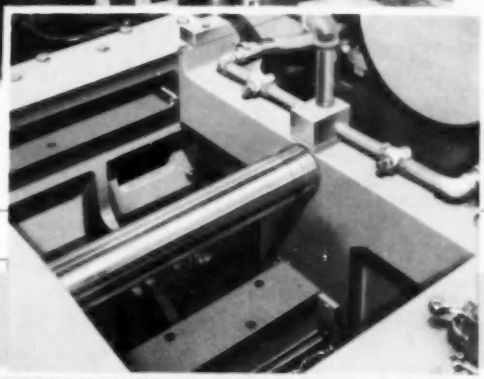
GREENLEE



The rough casting is machined wet on this 128 station, 225 ft. Greenlee palletized transfer machine. The machine is completely automatic with all operations synchronized. One operator handles the loading operation and controls all functions of the machine. The electrical control panel and system of lights locates immediately any trouble throughout the system. All hydraulic units conform to the J.I.C. standards for easy maintenance. An automatic lubricating system provides the correct amount of lubrication to the ways and moving parts.

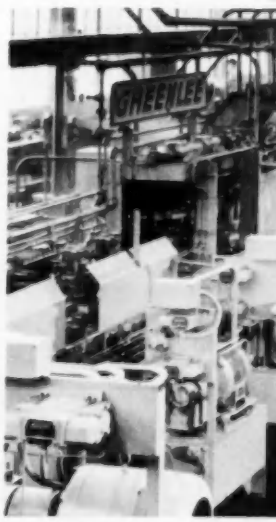


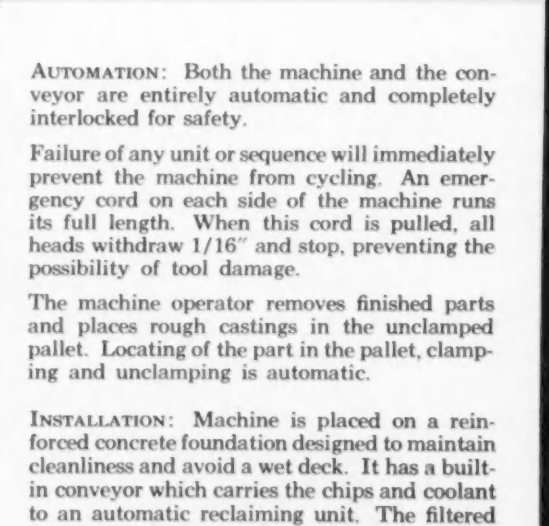


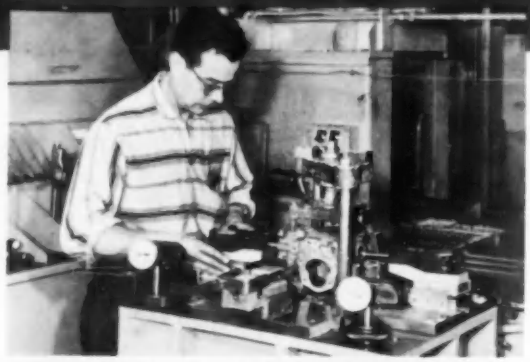


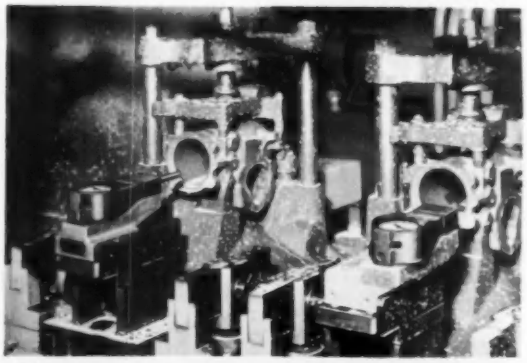
BORING ACCURACY ASSURED: Hydraulic steering gear housings call for a high degree of accuracy in the cylinder bore and pitman shaft hole. To maintain the accuracy, to increase tool life, and make pre-set tooling possible it was decided to use multiple blade boring tools.

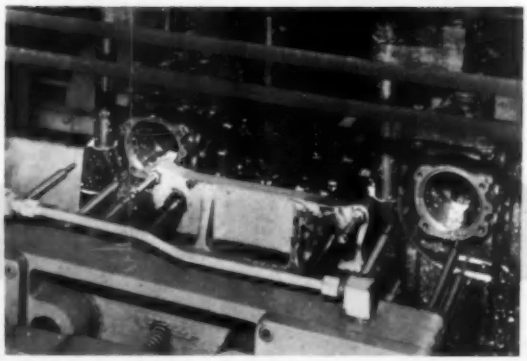
Greenlee boring slides of massive construction were used to properly support the boring tools. Tool life, accuracy and surface finish on the 3½ dia. x 7″ deep cylinder bore and the important pitman shaft hole have been far better than all estimates.











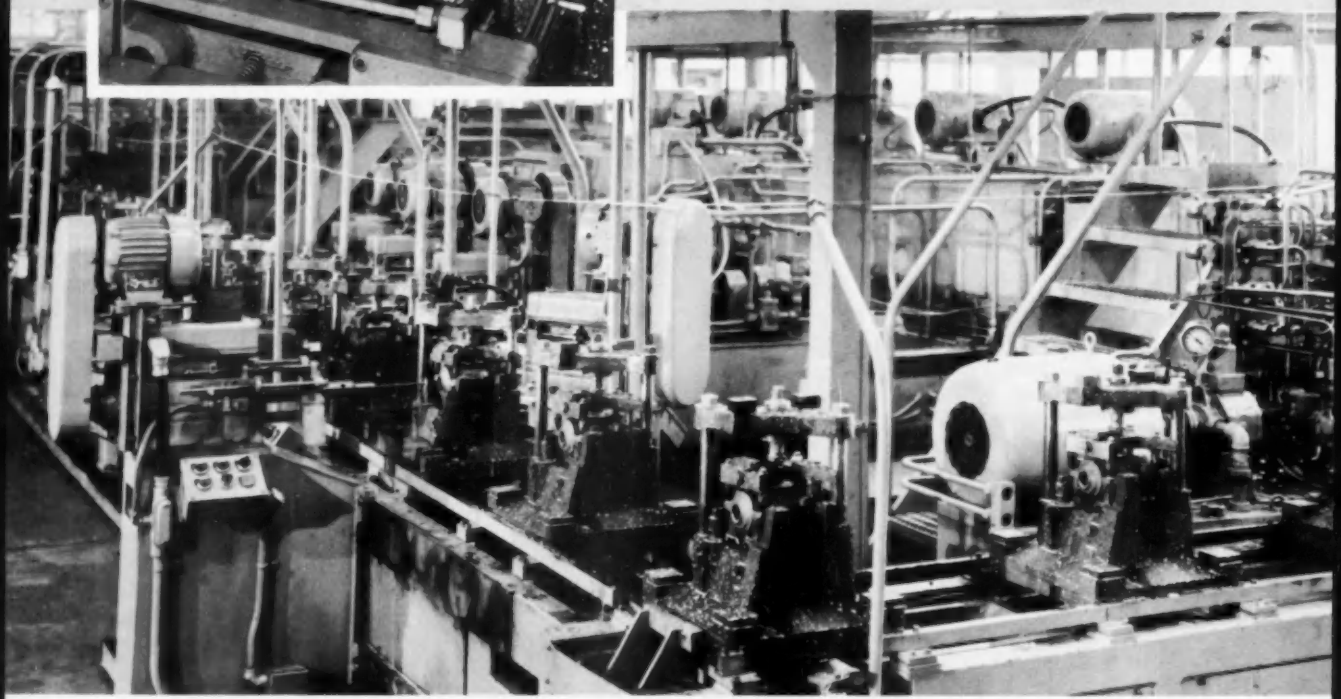
INSPECTION: Idle stations provided at intervals the length of the machine are used for both gauging and visual inspection.

In addition, at Stations 31 and 44 provision was made for the removal of pallets onto an inspection bank where more detailed inspection operations can be performed at regular intervals making certain of rigid quality control. During inspections, the machine continues to produce at the normal rate.

DEBURRING UNIT: Hydraulic devices must be absolutely free from all foreign matter. Deburring is an important and precise operation. Twelve stations were provided in the return conveyor where the pallet is located and clamped providing space for several automatic, and one hand burring operation. These include the deburring of drilled holes, corner breaking on cylinder bores and an emery cloth operation on finished faces. Deburring units are interlocked with the machine and conveyor.

FLEXIBILITY: Flexibility of operation is designed into the machine. Re-arrangeable unit construction and idle stations fitted with locating and clamping fixtures will make it possible to adapt the machine to a radically different housing at a fraction of the original cost.

PRODUCTION MACHINERY
GREENLEE



Printed in U.S.A.

AUTOMATION
News Report

(*Continued from page* 156)

are building wing panels for B-52 Stratofortresses. Each machine automatically drills and countersinks the hole, inserts a rivet slug, upsets both ends, shaves off the outer head, and then moves on to the next rivet.

The new riveters, which are about 12 ft high and 10 ft wide, roll back and forth over the work on floor rails. Wing panels as big as 75 ft in length and 4 ft wide can be riveted. The machines handle rivet-slug lengths in five different sizes. The three largest are driven at refrigerated temperature. Each machine drives 8 to 10 rivets per minute, fastening stiffeners to lower wing panels.

INSTRUMENT-AUTOMATION CONFERENCE

A leading Soviet educator will discuss Russian instrumentation education at the keynote technical session of the 13th Annual Instrument-Automation Conference, at Philadelphia's Convention Hall, Sept. 15-19.

Other sessions will include discussions of the Explorer satellite and launching instrumentation, trends in automatic controls and pushbutton mechanisms, and computer applications for all industries.

Some 400 exhibitors will display their products at the show, including the latest developments in every field of instrumentation. Theme of the conference, which is sponsored by the Instrument Society of America, is "Instrumentation in the Space Age."

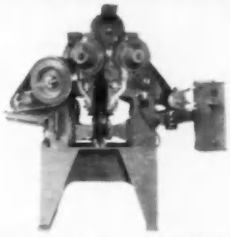
Conservationist Speaks Out For Annual Car Model Change

A University of Michigan conservationist has spoken out in defense of annual automobile model changes which are criticized in some quarters as "wasteful." Prof. Stanley A. Cain, chairman of the University's Dept. of Conservation, says yearly model changes do not waste natural resources because the used car market keeps cars running after the new models are out, and because of the salvage value of junked cars.

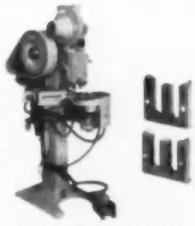
Speed up RIVETING and CLINCHING

Automatic feeding and setting with

T-J



RIVETS 4 AT A TIME! Special quadruple riveting unit, incorporating two Model "RR" Twin Rivitors, mounted on a special welded steel base. Equipped with air-operated hold down mechanism and a safety air trip arrangement. Tooled for riveting left hand and right hand automotive muffler bracket assemblies.



SPECIAL TWIN RIVITOR! Tooled for 6 station indexing fixture, incorporating automatic clamping and ejecting mechanisms, for riveting laminated armature assemblies.

T-J CLINCHOR adapted to a wide range of clinch nut setting problems. Gravity Feed model shown here.

You'll realize *faster assembly . . . reduced labor costs* immediately, when you use T-J Rivitors and Clinchors for your production line. These performance-proved machines are designed to do a wide range of assembly jobs for aircraft, automotive, farm machinery—riveting jobs of *all* kinds.

T-J RIVITORS automatically feed and set solid rivets with high production. Electrically powered Rivitor sets solid steel rivets up to ⅞" long. Throat depths 8" to 36".

T-J CLINCHORS set clinch nuts with fully automatic operation, controlled by a single foot pedal. Available in Underfeed and Gravity Feed models, throat depths 8" to 36".

Send today for these helpful references: Rivitor bulletins 646 and 555 . . . Clinchor bulletin 555. The Tomkins-Johnson Co., Jackson, Mich.

T-J TOMKINS-JOHNSON
RIVITORS AIR AND HYDRAULIC CYLINDERS CUTTERS CLINCHORS

METALS

(*Continued from page* 132)

70,000 tons. It logically follows that any upsurge in consumers' requirements, with accompanying effort to rebuild inventories, would result in a rapid reduction in the present top-heavy metal supplies of the smelters.

It is noteworthy that the zinc price has held unchanged at 10 cents a pound for well over a year and a half.

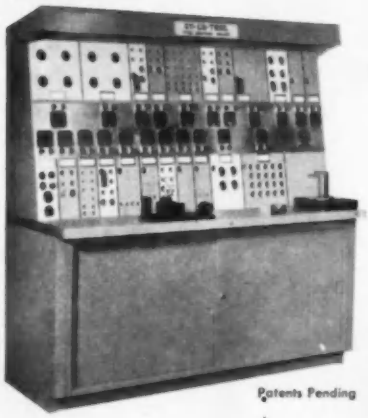
Lead Cut Again

Lead demand has been in the doldrums for many months. Successive price cuts have failed to stir up much buying interest. Demand from the battery manufacturers, main outlet for the metal, has been especially disappointing. The low rate of activity in Detroit is probably the most reasonable explanation. Like zinc, stocks of metal in the hands of producers have continued to increase. It is doubtful if the price would not have been reduced earlier below the 11 cent level if it had not been for the belief that the Seaton program would win Congressional approval, with its 14¾ cent price target. As hope waned for its passage, the price was cut again in mid-August to 10¾ cents, the lowest level for the metal since 1950. The cut followed lower prices in London, which dropped to equivalent of about 8.7 cents a pound.

CY-CO-TROL©

Tool Control Units

reduce production costs on all machines with multiple tooling!



Patents Pending

Built to customer specifications

- Keep your machines operating at top capacity . . .
- Helps eliminate down-time for machine adjustments . . .
- Eliminate trial runs . . .
- Reduce your tool breakage and costly rejects . . .

cyclemeters give you positive control of tool life

standard and special cycles used for all tool lengths

Many of our Units are now in use throughout the Automotive and Metalworking Industries.

Write for additional information and catalog

ROYAL design and manufacturing, inc.

4133 E. TEN MILE RD., CENTERLINE, MICHIGAN

Aluminum Price Increase Termed Moderate

The hike of 0.7 cents per pound in the aluminum price was not unexpected by the trade, and was somewhat less than feared. In 1956 and 1957, when similar wage increases were granted, the price of the metal was raised one cent a pound. Hence the new increase of less than ¾ cent was moderate, and does not begin to compensate for the 2 cent cut instituted last April, when Alcan slashed the price to meet Russian competition in Europe.

Consideration of the production figures indicates that the lowest level of output occurred in the year, and that some improvement in production of primary metal can be foreseen in the months ahead. Monthly output has recently been the lowest since 1955. It is well known that primary producers are operating at about 70 per cent installed capacity, but additional pot lines have been started, and the entry of two new producers must be reckoned with. Very likely July production exceeded 118,500 tons, at an annual rate of 1,422,000 tons.

Copper Output Declined in July

The result of steady cutbacks in mine production in this country is apparent in the July statistics of the Copper Institute. Crude output dropped to 64,416 tons for the month, or 2078 tons per day, about 33 per cent less than the average daily output last year. Unfortunately, the same thing can't be said for production abroad, which showed a 9000 ton increase over June. On a

...and we can prove it!

We can prove to your satisfaction that it is uneconomical to rebuild or modernize ANY upset forging machine more than 25 years old. Temporary conditions may make a rebuilding program attractive but a new ACME XN forging machine in a size suited to your needs will pay for itself in:

Less down-time
Increased production
Better quality of forging
Lower maintenance
Greater versatility

We can supply facts and figures to prove this statement.

Acme Model XN Forging Machines are made in seven sizes from 1¼" to 5" capacity. Conveyor type automatic feed is available on all sizes. Complete details available in Bulletin 58XN.

The HILL ACME Company

1209 W. 65th STREET • CLEVELAND 2, OHIO

"ACME" FORGING • THREADING • TAPPING MACHINES • ALSO MANUFACTURERS OF "HILL" GRINDING & POLISHING MACHINES HYDRAULIC SURFACE GRINDERS • "CANTON" ALLIGATOR SHEARS • BILLET SHEARS • "CLEVELAND" KNIVES • SHEAR BLADES

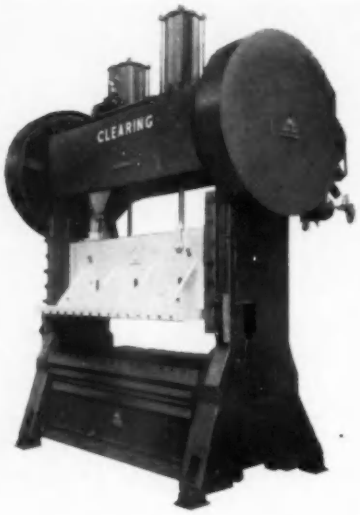
What You Should Know About

Press Capacity

A leading producer of home appliances is using the press above to good advantage. Clearing Series-S presses combine the precision of a straight side machine with a basically economical design.

This manufacturer can schedule a number of jobs for his machine – regardless of die height–and *know* he has the available press tonnage for each job.

Clearing provides a means for determining tonnage at *all* points of the stroke. A chart in the Clearing Series-S catalog shows press capacity which will be a helpful guide for determining capacity for all forming operations.



Write for your free copy.

HI-SPEED FOR SPECIAL JOBS?

SEE CLEARING

Clearing's line of Hi-Speed presses can be adapted to many special jobs. Here's one that's supplying a large home appliance manufacturer with metal dryer baskets.

A special control and special feeding equipment, automatically pierce thousands of holes in precisely positioned rows. An automatic Hi-Speed press like this can relieve you of many problems and speed up your manufacturing process, too.

For detailed information on Hi-Speed Presses, Write Clearing.

AND MANY MORE

BULLETINS

- ☐ Automation Accessories
- ☐ Unusual Press Applications
- ☐ Clearflo Lubrication
- ☐ Plunger Guiding
- ☐ Overload Device
- ☐ Micro-inching
- ☐ Enclosed Presses
- ☐ Cushions

CATALOGS

- ☐ Series-S Crankshaft Straight Side
- ☐ O.B.I.
- ☐ Bottom Drive
- ☐ Hydraulic
- ☐ Brochure—"New Economics of Press Automation"

MOVIES

- ☐ A Modern Fable
- ☐ Transflex—Automation in Action
- ☐ Modular Automation
- ☐ Automation Comes of Age

CLEARING PRESSES

the way to efficient mass production

CLEARING MACHINE CORPORATION *division of* **U.S. INDUSTRIES, INC.**

6499 W. 65th Street—Chicago 38, Illinois / Hamilton Division, Hamilton, Ohio

world basis daily mine production was slightly lower than in June, and refined stocks showed a small decrease to 475,275 tons, about 26,000 tons less than the peak reached in April.

Deliveries to fabricators gave a mixed picture. U. S. fabricators took 22,200 tons less than in June, while foreign fabricators accepted nearly 3300 tons more, thus maintaining the excellent rate of consumption that has characterized them since the first of the year.

Kennecott Increases Production

A halt in further cut-backs in domestic mine output was called by Kennecott early in August, when the big producer went back to a five-day week at its mines, increasing output about 5000 tons a month. This followed three earlier cutbacks which had brought Kennecott's production down to 67 per cent of its 1957 figure. While the move startled the industry, it was thoroughly in keeping with Kennecott's policy of producing as much metal as could be sold and still keeping the price competitive. The company has indicated many times that it wants no part in a runaway copper market.

Price Appears Stable

After many months it now appears that copper is establishing a one-price market in this country, with the producers and the custom smelters quoting the same figure of 26½ cents. Abroad, the metal has remained firm on the London Metal Exchange at somewhat more than the equivalent of 25¼ cents a pound. With the 1.7 cent tariff now in effect, there is evidently no profit in shipping copper to this country if London demand holds at present levels. There is reason to expect this will be the case, as demand on the Continent remains strong for wire bars, and an official announcement that exports of copper to Russia will be permitted in the near future could lend further strength.

AUTOMOTIVE INDUSTRIES KEEPS YOU INFORMED

SHORTIES

It is estimated that by 1975, the U. S. will be using something like 20 million barrels of petroleum a day, compared with an estimated 14.3 billion barrels daily in 1966.

•

About 4½ million cars, trucks and buses are scrapped yearly in the United States.

•

There are almost 500,000 rivets in the Boeing KC-135 jet tanker-transport, ranging in cost from 14 cents to $1.50 installed.

•

The average passenger car would operate for more than a year on the amount of fuel transferred through the air refueling boom on a Boeing KC-135 Stratotanker in one minute.

•

The Boeing KC-135 jet tanker-transport is made up of more than 50 per cent aluminum by weight and 10 per cent steel and stainless steel. Other metals include magnesium and titanium.

•

Enough material is contained in the tires of the Boeing KC-135 jet tanker-transport's landing gear to produce 100 automobile tires.

•

At 325 mph, each of the four Pratt & Whitney turbojet engines on the Boeing KC-135 Stratotanker develops 10,000 hp, the equivalent of 50 automobile V-8 engines rated at 200 hp each.

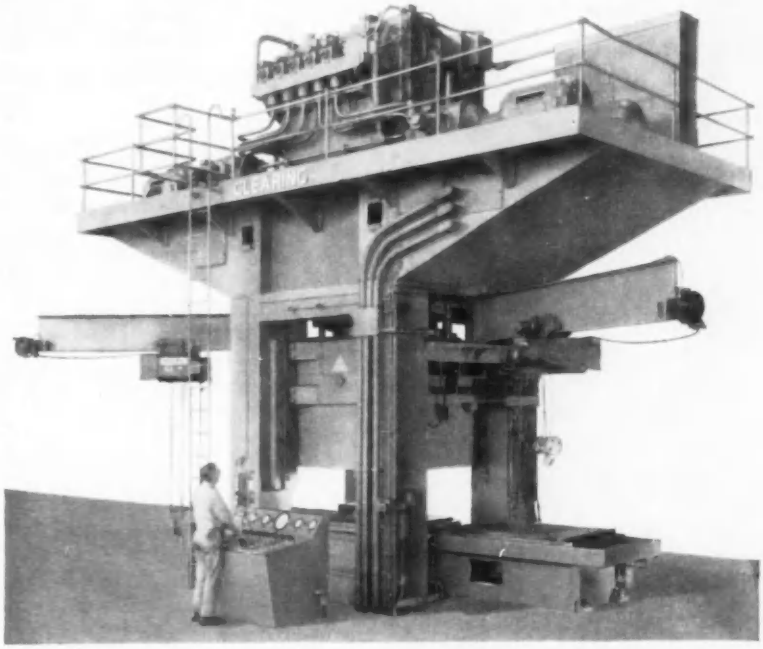
•

The total fuel carried on a single flight of a Boeing KC-135 Stratotanker would be enough to last the average driver 46 years.

•

Exports of motor vehicles in 1957 totaled about 350,000, including 155,000 cars and 195,000 trucks and buses, compared with a total of 398,000 in 1956.

Clearing Hydraulic Lowers Tooling Costs With Rubber Pad Forming



On this Clearing Rubber Pad Press, complex stainless, aluminum, or titanium parts can be formed in one operation – instead of the four or five operations required on conventional presses. In addition, dies for this method cost considerably less than conventional dies.

This Hydraulic Press has a rubber pad and container mounted on the slide. The pad acts as the female portion of the die. A male punch draw ring and draw ring pins are connected to a 3,150 ton cushion. This high tonnage cushion provides resistance to the main slide and in combination with the rubber pad makes complex forming possible. Relative pressure of cushion to main slide may be varied as necessary.

The press is designed with a rolling table so that blanks can be loaded outside the press on one group of dies while the press is working on another group. This same table can be used for quick die changing when using conventional tooling.

This is just one example of how Clearing can help you solve special production problems with hydraulic presses.

For additional information write Clearing.

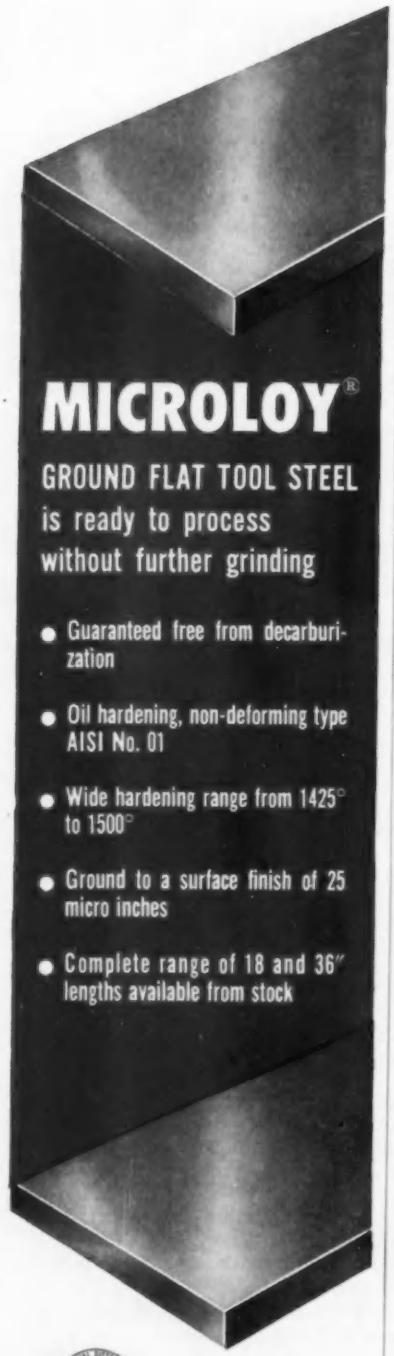
PRESSES

CLEARING

the way to efficient mass production

CLEARING MACHINE CORPORATION *division of* **U.S. INDUSTRIES, INC.**

6499 W. 65th Street—Chicago 38, Illinois / Hamilton Division, Hamilton, Ohio


MICROLOY®
GROUND FLAT TOOL STEEL
is ready to process
without further grinding
● Guaranteed free from decarburization
● Oil hardening, non-deforming type AISI No. 01
● Wide hardening range from 1425° to 1500°
● Ground to a surface finish of 25 micro inches
● Complete range of 18 and 36" lengths available from stock

See Your Capewell Distributor

CAPEWELL

THE CAPEWELL MFG. CO.
HARTFORD 2, CONN.

Observations

By Joseph Geschelin

Early Start

The 1958 model year is being rushed to an early close leaving the way clear for launching an entirely new and dramatically different crop of motor cars. They will be very different, judging by a few samples we have seen. It is certain that 1959 will not be a face-lift year, self-styled critics to the contrary.

Styling Trends

We sense that the '59 season will bring about a clash of advertising claims, stemming from differences in styling philosophy. On one side are those who have cast the die in favor of a revolutionary change in appearance even to the extent of discarding family identification. On the other are those who retain the basic character of former styling by altering front and rear end sheet metal and changing decorative treatment on the sides. True, the latter doubtless were not ready to make major body changes this year. Nevertheless, the basic question still remains: is the old idea of carrying on the traditional look good enough to persist or is it going by the board?

Lowering Levels

'59 cars are going to be lower than ever. Have we reached the limit insofar as ground clearance and headroom are concerned. While the styling has excellent eye appeal, getting in and out of the low, low cars has got to be a problem. It takes young, nimble joints to get in and out. In fact, one prominent line has introduced swivel seats to make it somewhat easier for women to make the maneuver more gracefully. Incidentally, how do the beautiful models get in and out so smoothly? Many women are wondering about this. Maybe something could be done to show them how.

Exhaust Systems

There is a move to make mufflers and tailpipes longer-lasting. Thus far, one of the major car makers reports using heavier stock and zinc-coated sheet to make the system more resistant to thermal shock and the corrosive effects of water and acid. This is an important move to win public approval. With the widespread introduction of dual exhaust systems car owners are just beginning to learn what it costs to replace. Some of our friends report spending around $75 or more for the job.

Air Ride

—is shaking down to workable levels what with the experience gained in some meager installations in 1958. Influence of buyer resistance to high costs is reflected in many 1959 installations. For example, a number of makes have shifted to just two air bags—only at the rear, on the theory that leveling is the major feature of the air ride. On these makes the air bags play a minor role in supplementing either coil springs or leaf springs. From a design and manufacturing standpoint, this arrangement aids in reducing cost materially by relying upon the Hotchkiss drive to eliminate the costly mechanism employed last year. On some makes that retain four air bags, the rear air bags now supplement variable rate leaf springs which take the drive, eliminate the mechanism used last year. Nevertheless, some makes have retained air bags at all corners. Air ride appears to be here to stay and it will take another year or two before it assumes some final shape.

high reliability . . . extreme compactness . . .

IN THE

NEW SANBORN 850

6- & 8-CHANNEL DIRECT WRITING SYSTEM

If you want a practical direct writing system for straightforward recording in the range from DC to 100 cps — such as computer readout, telemetry recording — look what the new Sanborn "850" offers in compactness, reliability and operating convenience. A complete 8-preamplifier module with power supply, plus an 8-channel flush-front recorder package containing power amplifiers and power supply at rear, occupy only 24½" of "850" panel space.

PERFORMANCE characteristics of an "850" include flat frequency response 0–70 cps, down 3 db at 100 cps (10 div. peak-to-peak amplitude) . . . thermal drift eliminated by current feedback power amplifiers . . . limiting at input to prevent amplifier saturation or cut off, so that damping is never lost . . . drift less than 0.2 div. for 20° to 40° C. changes, line voltage changes from 103 to 127 volts . . . gain stability better than 1% with 20° C. and 20 volt changes . . . linearity 0.2 div. over 50 divisions . . . clear, permanent, inkless recordings in true rectangular coordinates.

IN RELIABILITY, "850" features include fully transistorized power amplifiers and power supply . . . rugged galvanometers with low impedance, high current, enclosed coil assemblies and velocity feedback damping . . . JAN components wherever practical, such as MIL-T-27 hermetically sealed power transformers, MIL-approved electrolytics in power supplies, etc. . . . forced filtered air cooling for stable operation.

And in operating **CONVENIENCE,** an "850" system provides such advantages as nine electrically controlled chart speeds, selected by pushbuttons . . . a choice of interchangeable Preamplifiers (DC Coupling and Phase Sensitive Demodulator presently available, with others in development) . . . remote control of chart drive, speeds, timer and marker . . . monitoring connection points . . . a Recorder that loads from front and has built-in paper take-up and paper footage indicator.

SANBORN COMPANY

175 Wyman Street, Waltham 54, Mass.

Visit Sanborn Booths 957-959 at I.S.A. Show

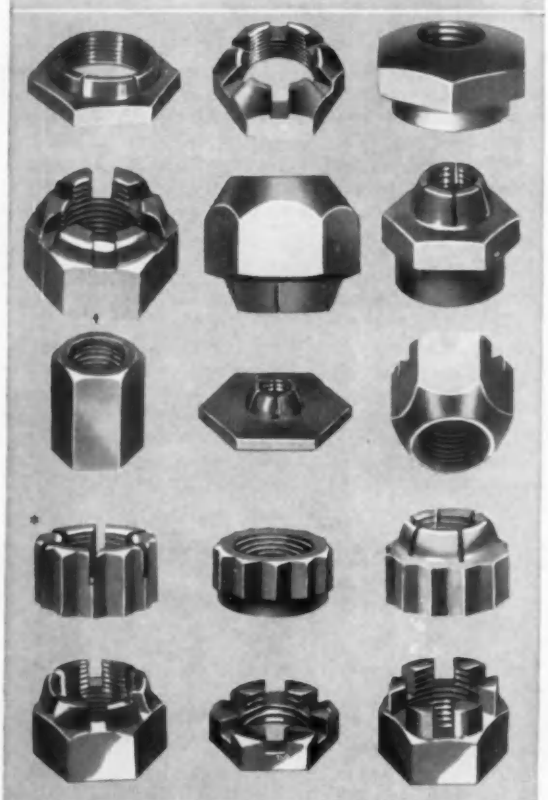
Ask your local Sanborn Industrial Sales-Engineering Representative for complete facts — or write the Industrial Division in Waltham.

(All data subject to change without notice)

SPECIAL NUTS

to specs. 7/16"—4¼" cross flats

special machines + large stock of material × years of experience = speedy deliveries high quality low prices



Here are a few samples made to customers specifications . . Our batteries of special high-speed multi-spindle, automatic machines make possible fast and accurate production of hexagon nuts of non-standard height and special shape from carbon or alloy steel, Naval bronze or other non-ferrous metals; also AN 310 through AN 335 as per latest Airforce specifications. Very often the special nut you require may be similar to one we are already making and a simple modification would result in a price advantage and quicker deliveries to you . . Send us your blueprint and particulars —let us quote on your requirements . . We also have a catalog that contains complete specifications, engineering data and prices regarding our standard nuts.

*12 Pointer Standards, sizes: ¼" to ¾"—brochure on request

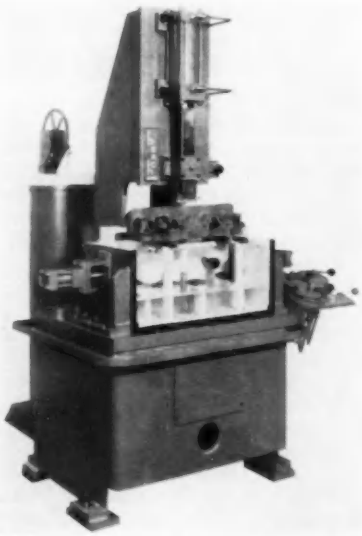
NATIONAL MACHINE PRODUCTS

*Manufacturer of Standard and Special *12 Pointer and Hexagon Nuts . . . "Huglock" and "Marsden" locknuts.*

44225 Utica Rd., UTICA, Michigan

SPS/COMPANY

NEW APPLICATION OF UNDERWATER LEAK TESTING



Now—Beach Engineering, one of the few companies to meet the exacting specifications on testing automotive air springs, again announce a new system of testing.

Designed to test automotive cylinder heads, the machine shown, departs from the conventional method of fixturing the part and immersing part fixtures clamping cylinders, etc., in a water tank.

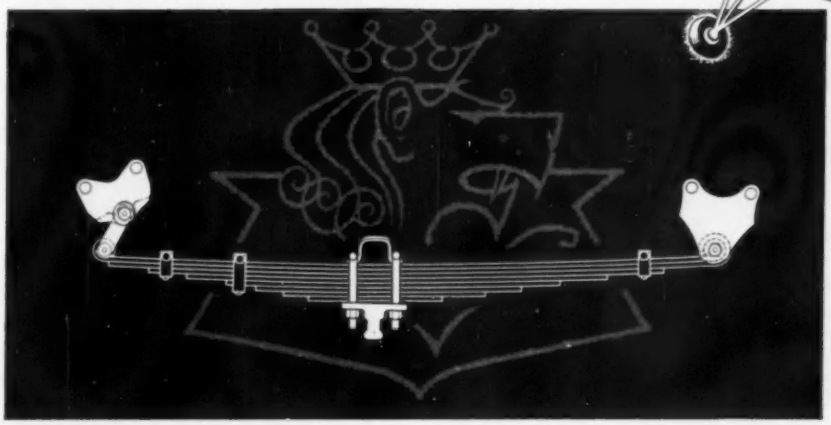
The parts are laid on, or transferred to, a position under the depressing cylinder, and powered down to make contact with the face seals. Side and end seals are then brought in, water in storage tank is then displaced into fixture in approximately 3 seconds, at which time air pressure is supplied to part—to visually detect leaks.

The unusual feature of the test is that minute bubbles of air, ordinarily hard to detect breaking the surface of the water, can easily be detected by the operator as he has a diver's view of the part.

BEACH ENGINEERING, INC.

3950 W. 11 Mile Rd., Berkley, Mich.
or
P.O. BOX 368, ROYAL OAK, MICH.

"Functional Simplicity"



. . . Hallmark of Modern Design

The "functional simplicity" of leaf spring design provides performance-proven suspension PLUS the BUILT-IN FACTORS of impact cushioning—self alignment—load balance control—sidesway control—shock absorbing action.

Leaf springs can be designed to fit any desired ride requirement.

DSP *Leaf* **SPRINGS**

DETROIT STEEL PRODUCTS DIVISION

OF *Fenestra* INCORPORATED

1500 Trombly Avenue, Detroit 11, Michigan

Since 1904—Original equipment on cars, trucks, cabs, buses, trailers

KELSEY-HAYES COMPANY
Gen'l Offices: Detroit 32, Mich.
Automotive, Aviation and Agricultural Parts • Hand Tools for Industry and Home

18 PLANTS: Detroit and Jackson, Michigan; Los Angeles; McKeesport, Pa.; Springfield, Ohio (Speco Division); Utica, New York (Utica Drop Forge & Tool Division); Davenport, Iowa (French and Hecht Division); Philadelphia (Heintz Division); Clark, New Jersey (New Jersey Division); Windsor, Ontario, Canada.

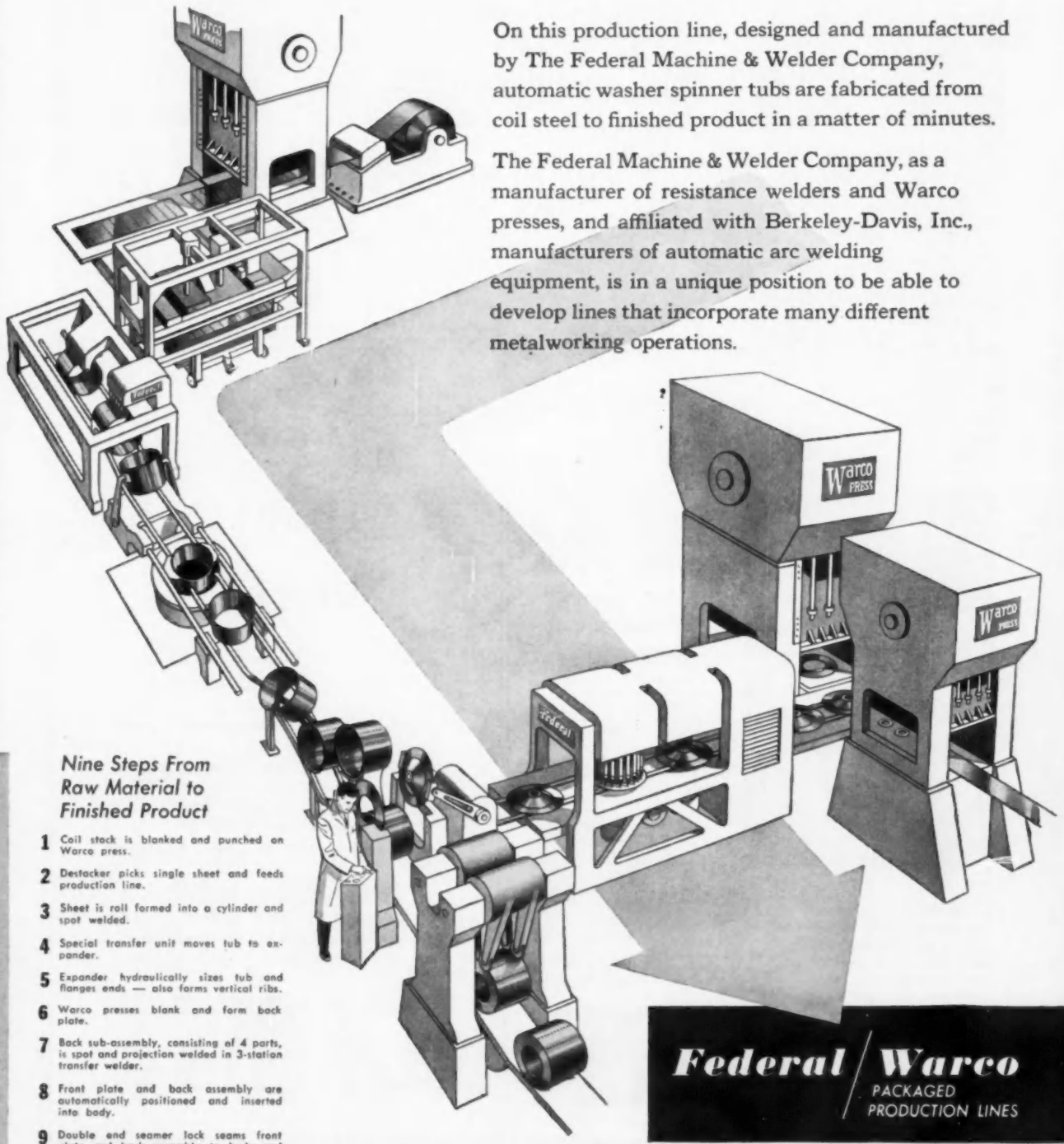
Reflected in this modern motor car wheel, hub-and-drum, and brake assembly are the precision and excellence of quality which have earned for Kelsey-Hayes a respected name among suppliers to the automotive industry since 1908. Products representative of the specialized skills and facilities of Kelsey-Hayes in the manufacture of fine automotive parts and components include: *wheels, brakes, hubs and drums, power brakes, transmission bands and other chassis parts.*

THE ACCENT IS ON PRODUCTION

in a production line by FEDERAL

On this production line, designed and manufactured by The Federal Machine & Welder Company, automatic washer spinner tubs are fabricated from coil steel to finished product in a matter of minutes.

The Federal Machine & Welder Company, as a manufacturer of resistance welders and Warco presses, and affiliated with Berkeley-Davis, Inc., manufacturers of automatic arc welding equipment, is in a unique position to be able to develop lines that incorporate many different metalworking operations.



Nine Steps From Raw Material to Finished Product

1. Coil stock is blanked and punched on Warco press.
2. Destacker picks single sheet and feeds production line.
3. Sheet is roll formed into a cylinder and spot welded.
4. Special transfer unit moves tub to expander.
5. Expander hydraulically sizes tub and flanges ends — also forms vertical ribs.
6. Warco presses blank and form back plate.
7. Back sub-assembly, consisting of 4 parts, is spot and projection welded in 3-station transfer welder.
8. Front plate and back assembly are automatically positioned and inserted into body.
9. Double end seamer lock seams front plate and back assembly to body and ejects finished tub.

* Sequence of operations controlled by static relay system designed and built by Federal.

Federal / Warco
PACKAGED PRODUCTION LINES

THE FEDERAL MACHINE AND WELDER COMPANY, WARREN, OHIO
Affiliated with Berkeley-Davis, Inc., Danville, Illinois

STAMPINGS

Produced economically in our modern plant for:

AUTOMOTIVE, INDUSTRIAL EQUIPMENT, AIRCRAFT, AGRICULTURAL INDUSTRIES AND OTHERS; will boost your output at material savings.

Our production, engineering and tool-room facilities are geared to the volume usage of your industry.

Send us your inquiries

LANSING STAMPING COMPANY

1157 So. Penn. Ave.

Lansing 4, Michigan

ESTABLISHED 1914

DYKEM STEEL BLUE

Stops Losses making Dies and Templates

Popular package is 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

Write for sample on company letterhead

THE DYKEM COMPANY

2301-L North 11th St. • St. Louis 6, Mo.

CUT SCRAPER TIME

END NIGHT CLEANUP & MORNING REBLUING

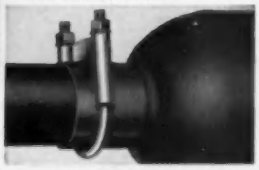
DYKEM HI-SPOT BLUE No. 107 is used to locate high spots when scraping bearing surfaces. As it does not dry, it remains in condition on work indefinitely, saving scraper's time. Intensely blue, smooth paste spreads thin, transfers clearly. No grit; noninjurious to metal. Uniform. Available in collapsible tubes of three sizes. Order from your supplier. Write for free sample tube on company letterhead.

THE DYKEM CO., 2301-L NORTH 11TH ST., ST. LOUIS 6, MO.

CLAMP . . . don't CRAMP MUFFLER CONNECTIONS

Get 360 Degree, 100% Leak-proof Tightness

This new, patented, precision-formed Clamp provides a positive 360° leak-proof seal of superior strength yet possessing sufficient flexibility to prevent "freezing" and possible joint breakage. Light weight; easy to assemble; improves exhaust system; gives long-lived service; re-useable.



Metal Clamp of 13 gauge material with ⅜" U-Bolt. Available in sizes from 2" to 4". Write or phone for complete information and prices.

Adopted as original equipment by manufacturers; sold for replacement by their dealers and distributors; also available through service parts outlets and all RIKER MUFFLER distributors.

Inquiries invited from factories, dealers and truck and bus fleet operations.

CLAMPS, Inc.,

DIVISION OF

RIKER MANUFACTURING, INC.

4901 STICKNEY AVE. • TOLEDO 12, OHIO

AUTOMOTIVE INDUSTRIES

is read by general executives, production men, engineers, purchasing agents and others whose o.k. means orders for those who sell to the World's Largest Manufacturing Industry.

Graph-Mo® dies cut downtime 50% on deep draw for round vacuum cleaner!

ENGINEERS at The Hoover Company had a tough problem in getting that round vacuum cleaner shape in the new Constellation. The two circular dies that form the hemispheres often galled, picking up bits of the steel being formed. This scored the dies, marred the finished parts. Production had to be shut down while the dies were repolished. And extra polishing of the hemispheres ran up costs still more.

After studying the problem, Timken Company metallurgists recommended dies made from Graph-Mo®—a special tool steel developed by the Timken Company. Results were outstanding. The new Graph-Mo dies cut downtime 50%. The combination of free graphite particles and diamond hard carbides in its structure make it outwear other tool steels 3 to 1. Production rolled smoothly and refinishing time was cut.

Graph-Mo machines 30% easier than conventional tool steels. And its uniform response to heat treatment eliminates distortion—saves time and money in lots of tough jobs.

Graph-Mo is one of four graphitic tool steels developed by the Timken Company. If you would like more information about their uses in dies, punches, gages and machine parts, send for the new Timken Graphitic Steel Book. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

TIMKEN *Fine Alloy* **STEEL**

TRADE-MARK REG. U.S. PAT. OFF.

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS STEEL TUBING

Index to

This Advertisers' Index is published as a convenience, care will be taken to index correctly. No allow-

A

Ajax Mfg. Co. 104
Allis-Chalmers (Industrial Equipment Div.) 110
Amchem Products, Inc. 15
American Chain & Cable Co. 10
American Steel & Wire Div. 11
Automatic Spring Coiling Co. ... 152
Automotive & Aircraft Div. 10

B

Baush Machine Tool Co. 95
Beach Engineering, Inc. 168
Bendix Aviation Corp. Products Div. 52
Bethlehem Steel Co. 43
Binks Mfg. Co. 109
Bullard Company 6

C

Capewell Mfg. Co. 166
Chambersburg Engineering Co. .. 49
Cincinnati Milling Machine Co. ..96-97
Clamps, Inc. 172
Clearing Machine Corp. 164-165
Columbia-Geneva Steel Div. 11
Continental-Diamond Fibre Div. .. 136
Continental Screw Co. 66
Copperweld Steel Co. Aristoloy Steel Div. 135
Ohio Seamless Tube Div. 24
Cotta Transmission Co. 1
Cross Company 12-13

D

Detroit Steel Products Div. 169
du Pont de Nemours Co. Teflon 153
Dykem Co. 172

E

Eastman Mfg. Co. 68
Eaton Mfg. Co., Valve Div. 54
Enjay Co., Inc. 8
Ex-Cell-O Corp. .....69 thru 72

F

Federal Machine & Welder Co. 171
Fellows Gear Shaper Co. 46-47
Ferry Cap & Set Screw Co. 37

G

G & O Mfg. Co. 175
Garrett Corp. (AiResearch Industrial Div.) 30
Gear Grinding Machine Co. 36
Gisholt Machine Co. 9
Goodrich Chemical Co, B. F. 176
Greenlee Bros. & Co. .....157 thru 160
Gridley Machine Div. .....32 thru 35

H

Hansen Mfg. Co. 154
Hartford Machine Screw Co. 144
Hill Acme Co. 163
Hydreco Div. New York Air Brake Co. 73
Hy-Pro Tool Co. 66

I

Inland Mfg. Div. 4
International Nickel Co. 2

K

Kelsey-Hayes Co. 170
Kent-Owens Machine Co. 20
Kingsbury Machine Tool Corp. 42

L

Lansing Stamping Co. 172
La Salle Steel Co. 5
LeBlond Machine Tool Co., R. K. 22-23
Lees-Bradner Co. 145
Linde Co. 150
Lucas Machine Div. (New Britain Machine Co.) 137-138

M

McKay Machine Co. 151
Mahon Co., R. C. 40
Marbon Chemical Div. 7
Mechanics Universal Joint Div. .. 14
Michigan Tool Co. 94
Micromatic Hone Corp. 142-143
Micro-Poise Engrg. & Sales Co. .. 44
Moline Tool Co 28
Murray-Way Corp. 27

N

National Automatic Tool Co. 50-51
National Machine Products Co. ... 168
National Screw & Mfg. Co. 39
New Britain Machine Co. Gridley Machine Div. ...32 thru 35
Lucas Machine Div. 137-138
New Departure Div. .....Back Cover
New York Air Brake Co., Hydreco Div. 73

O

Ohio Seamless Tube Div. Copperweld Steel Co. 24

P

Pangborn Corp. 129
Perfect Circle Corp. 133

Advertisers

and not as part of the advertising contract. Every once will be made for errors or failure to insert.

R

Raybestos-Manhattan, Inc. Equipment Sales Div. ... 16
Rockwell-Standard Corp., Transmission & Axle Div. ... 41
Roebling's Sons Corp., John A. ... 67
Royal Design & Mfg., Inc. ... 162

S

SKF Industries, Inc. ... 25
Sanborn Co. ... 167
Schwitzer Corp. ... 131
Southern Screw Co. ... 141
Standard Oil Co. (Indiana) ... 2nd Cover
Standard Tube Co. ... 156
Stewart-Warner Corp. ... 45
Sturtevant Co., P. A. ... 175
Sundstrand Machine Tool Co. ... 18-19

T

Tennessee Coal & Iron Div. ... 11
Texas Company ... 65
Thompson Products, Inc.
Tapco Group ... 38
Michigan Div. ... 21
Thor Power Tool Co. ... 155
Timken Roller Bearing Co. ... 173
Tomkins-Johnson Co. ... 161

U

Udylite Corp. ... 29
United States Gasket Co. ... 148
United States Steel Corp. ... 11

V

Vickers, Inc. Div. Sperry Rand Corp. 48

W

Waldes Kohinoor, Inc. ... 17
Wausau Motor Parts Co. ... 146-147
Weirton Steel Co. ... 31
Wyman-Gordon Company ... 26

Y

Youngstown Sheet & Tube Co. ... 149

Z

Zollner Corp. ... 3rd Cover

G&O Radiators
43rd Year

ENGINE COOLING RADIATORS
•
HEATERS
•
OIL COOLERS
•

THE G & O MANUFACTURING CO.
142 WINCHESTER AVENUE
NEW HAVEN CONNECTICUT

TORQUE
applied by the inch ounce

Available in these Torque Ranges

MODEL	CAPACITY
F80-I-G	0- 80 inch grams
F8-I-O	0- 8 inch ounces
F16-I-O	0- 16 inch ounces
F32-I-O	0- 32 inch ounces
F80-I-O	0- 80 inch ounces
F160-I-O	0-160 inch ounces

Inch pound models and larger foot pound ranges also available

sent on request

P.A. Sturtevant Co.
ADDISON QUALITY ILLINOIS

Another new development using

B.F.Goodrich Chemical *raw materials*

"Zippertubing" is produced in standard lengths from 25 to 1000 feet, in varying sizes and colors, by The Zippertubing Company, Los Angeles. Shielding material used in it is manufactured by Cordo Chemical Corporation. B.F. Goodrich Chemical Company supplies the Geon polyvinyl material.

New shielding and jacket made with Geon can be zipped on in a single operation

Production and maintenance of wire harnesses are greatly simplified with this new shielding and jacket combination made with Geon polyvinyl material. All you do is zip it on. Saves time and equipment during manufacture—makes it easy to replace the jacket if it has to be removed to get at wiring for service.

For regular RF shielding, glass cloth saturated with Geon polyvinyl material is laminated to aluminum foil. It gives 100% coverage to provide immediate grounding of RF and UHF interference. The outer surface, also of Geon, has zipper tracks sealed in. A pull tab can easily be used to facilitate closure.

For heavier magnetic shielding, special steel foil is laminated between layers of Geon. Lead saturated glass cloth is available for radiation problems.

Geon provides high insulation resistance, heat stability and extra strength, as well as accuracy in molding. It's another example of versatile Geon proving the key to a dramatic new product. For information, write B.F. Goodrich Chemical Company, Dept. LN-5, 3135 Euclid Avenue, Cleveland 15, Ohio.

B.F.Goodrich Chemical Company
a division of The B.F.Goodrich Company

B.F.Goodrich

GEON polyvinyl materials • HYCAR American rubber and latex
GOOD-RITE chemicals and plasticizers • Harmon colors

The Piston with "Double Bonded" "Ni-Resist Iron" Top Ring Section

STOPS! RING GROOVE WEAR!

BOND-E-LOC*

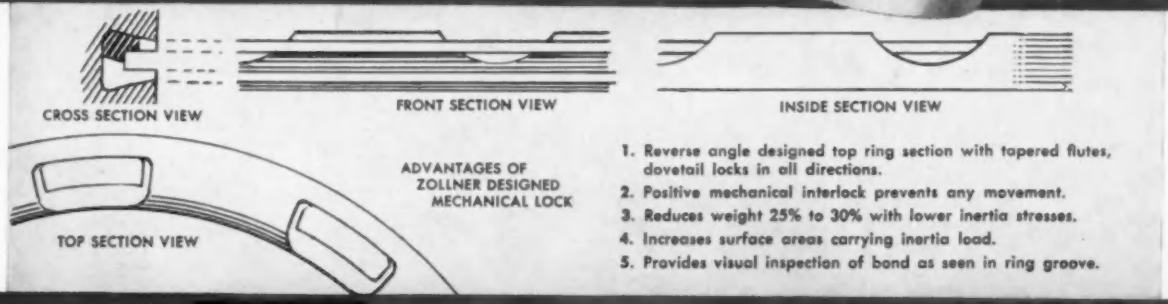
Exclusively **DOUBLE BONDED**
METALLURGICALLY Al-Fin Process
MECHANICALLY Zollner Lock

Licensed under Patents 2,306,730, 2,455,457, 2,550,879

Keeps Engines Powerful Longer —at Lowest Cost

"A sensational development — the greatest mileage piston we have ever used." Everywhere, engine builders and transport operators enthuse over the performance of Zollner Bond-O-Loc Pistons. Top ring groove wear problems are eliminated by the "Ni-resist" Iron section *permanently* incorporated with the double bond of *both* A1-Fin metallurgic *and the exclusive* Zollner mechanical lock. Separation failure is impossible. For longer piston life and lower maintenance cost, we suggest your immediate test of Bond-O-Loc advantages.

*T.M. Reg. Pat. App. for



1. Reverse angle designed top ring section with tapered flutes, dovetail locks in all directions.
2. Positive mechanical interlock prevents any movement.
3. Reduces weight 25% to 30% with lower inertia stresses.
4. Increases surface areas carrying inertia load.
5. Provides visual inspection of bond as seen in ring groove.

ADVANCED ENGINEERING

PRECISION PRODUCTION

COOPERATION with Engine Builders

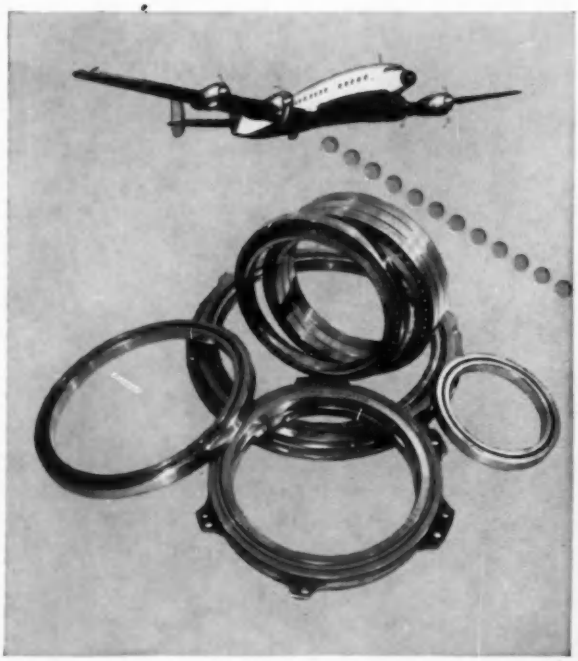
ZOLLNER PISTONS

THE ORIGINAL EQUIPMENT PISTONS

ZOLLNER

ZOLLNER CORPORATION • Fort Wayne, Indiana

ND FACTS



IN THE AIR...ON THE GROUND... IT'S THE UNSEEN THAT COUNTS!

It's what you don't see in the ball bearings produced by New Departure that makes these products outstanding.

Invisible are the years of experience . . . the accumulated knowledge of materials, metallurgy, design and precision manufacturing methods. These are the hidden elements that make New Departure the preferred source for bearings that must be right for every job. Yes, New Departure ball bearings are built to meet many exacting specifications such as load capacity, endurance, speed, accuracy and temperature.

For the unseen factors in bearings that help make America tops in the air or on the ground, look to New Departure, where experienced bearing engineering assistance is at your service, too.

1908–1958
GM
FORWARD FROM FIFTY

ND NEW DEPARTURE
DIVISION OF GENERAL MOTORS, BRISTOL, CONN.
NOTHING ROLLS LIKE A BALL